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STUDIES IN THE MELASTOMATACEAE OF CHINA¹

HUI-LIN LI

IN making identifications of recent collections of plants from southern and southwestern China, it was observed that much remained to be done in clarifying the classification of Chinese Melastomataceae. Consequently a review of the family as represented in China was undertaken, involving a study of all genera and species recorded from China and an examination of all available specimens and the published records. Many nomenclatural adjustments are made involving new synonyms and new combinations. A number of apparently hitherto undescribed species are noted. In some groups the generic limits appear to be sharply defined, while in others, especially the Oxysporeae and Sonerileae, difficulties are encountered because of certain rather complex characters normally used in attempts to delimit genera. In these genera, complete flowering and fruiting specimens are indispensable in ascertaining the correct generic disposition of certain entities, and not infrequently species have been placed in wrong genera because of lack of adequate material. The accumulated collections now available, assembled through recent extensive botanical explorations in China, have provided us with ample material representing some of the previously imperfectly known species, and it thus becomes possible to make more exact determinations.

This study is based on the collections of the Arnold Arboretum (A), the Gray Herbarium (G), and the New York Botanical Garden (N). While all the known Chinese species of the family are accounted for, this paper is not intended to be a complete revision, for the reason that types of certain species have not been available for consultation because of war conditions. To the curators of the above-mentioned herbaria, I am indebted for their kindness in furnishing the material for this study.

In addition to the several general monographic studies of the family published in the nineteenth century, there are several important papers

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treating various groups of the Melastomataceae of eastern Asia. In 1892, Stapf published a paper, "On the Sonerileae of Asia" (Ann. Bot. **6**: 291-320. 1892), in which he described two new genera from China, *Fordiophyton* and *Gymnagathis*. Guillaumin, in 1913, in a series of papers entitled "Contribution à l'étude des Mélastomacées d'Extrême-Orient" (in Lecomte, Not. Syst. **2**: 301-323. 1913, Bull. Soc. Bot. France **60**: 86-92, 273-276, 362-371, 401-406. 1913), treated various genera. He re-identified many of Lévillé's Chinese species that had erroneously been ascribed to the Melastomataceae and provided a complete list of the species of eastern Asia known at that time, with keys to the genera and species. Diels' "Beiträge zur Kenntnis der Melastomataceen Ostasiens" (Bot. Jahrb. **55**: 97-119. 1932) considered the species of Oxysporeae and Sonerileae, and he described many new species and one new genus, *Cypotheca*, from China. In these two tribes Diels' arrangement has here been accepted, with occasional new names and transfers. Keys to the species of the genera in these groups have been prepared only as the addition of new species indicates this as desirable.

KEY TO THE SUBFAMILIES AND GENERA OF CHINA

- A. Ovary usually 4- or 5-celled; ovules very many; fruits many-seeded; embryo very small.
 - B. Anthers opening by a single terminal pore; placentas axile.I. MELASTOMATOIDEAE.
 - BB. Anthers opening by slits; placentas parietal, nearly basal.II. ASTRONIOIDEAE.
- AA. Ovary 1-celled; ovules about 9; placentas free central; fruits 1-seeded; embryo large.III. MEMECYLOIDEAE.

Subfamily I. MELASTOMATOIDEAE

- A. Seeds curved through half a circle, minutely punctate (Tribe OSBECKIEAE).
 - B. Stamens all alike; fruits dry, tardily dehiscent.1. *Osbeckia*.
 - BB. Stamens very unequal; fruits somewhat fleshy, indehiscent.2. *Melastoma*.
- AA. Seeds straight, oblong, obovate, or cuneate, not curved.
 - B. Fruits capsular, loculicidally dehiscent.
 - C. Ovary with the top usually free and conical; inflorescences terminal or axillary, the flowers arranged in panicles, cymes, or fascicles, never scorpioid (Tribe OXYSPOREAE).
 - D. Stamens 8, equal or unequal.
 - E. Stamens equal or subequal.
 - F. Inflorescences pseudo-umbellate; connectives at the base of the anther gibbose or subcalcarate behind; fruits not ridged.3. *Plagiopetalum*.
 - FF. Inflorescences paniculate; connectives not appendaged behind; fruits strongly ridged.4. *Allomorpha*.
 - EE. Stamens very unequal.
 - F. Connectives at base slightly produced in front, not calcarate behind.
 - G. Flowers pseudo-umbellate; connectives gibbose-thickened behind.5. *Cypotheca*.
 - GG. Flowers in large elongated panicles; connectives not gibbose-thickened behind.6. *Oxyspora*.
 - FF. Connectives at base bisetose in front, often calcarate behind.7. *Barthea*.

- DD. Stamens 4, equal. 8. *Blastus*.
 CC. Ovary flattened or depressed at the top; inflorescences terminal, rarely axillary, usually in umbels or cymes, sometimes in panicles, in some cases scorpioid (Tribe SONERILEAE).
 DD. Flowers 4-merous; stamens 8, rarely 4.
 E. Inflorescences in umbels, cymes, or panicles, the branches not scorpioid.
 F. Connectives at the base of the anthers 2-tuberculate in front, shortly calcarate behind. 9. *Bredia*.
 FF. Connectives at the base of anthers inappendiculate or only slightly calcarate behind.
 G. Anthers not attenuate, the tips of the anther-cells free and slightly projecting; connectives at the base of anthers often calcarate behind. 10. *Sarcopyramis*.
 GG. Anthers usually attenuate, the anther-cells united to their very tips; connectives inappendiculate or shortly calcarate behind.
 H. Stamens 8, very unequal, or sometimes 4; connectives not calcarate behind.
 I. Anther-sacs produced at the base. ... 11. *Fordiophyton*.
 II. Anther-sacs not produced at the base. 12. *Staphiophyton*.
 HH. Stamens 8, equal or subequal; connectives usually short-calcarate behind. 13. *Phyllagathis*.
 EE. Inflorescences in large panicles, the ultimate branches scorpioid.
 14. *Scorpiothyrsus*.
 DD. Flowers 3-merous; stamens 3 or sometimes 6; inflorescences in scorpioid cymes. 15. *Sonerila*.
 BB. Fruits baccate, indehiscent (Tribe DISSOCHAETAEAE).
 C. Stamens unequal. 16. *Anplectrum*.
 CC. Stamens equal. 17. *Medinilla*.

Subfamily II. ASTRONIOIDEAE

18. *Pternandra*.

Subfamily III. MEMECYLOIDEAE

19. *Memecylon*.

1. OSBECKIA

Osbeckia Linnaeus, Sp. Pl. 345. 1753.

Although nine species of *Osbeckia* are credited to China, I can recognize only five species with certainty. Two of Craib's new species are reduced to synonymy. Guillaumin (in Lecomte, Not. Syst. 2: 307, 311. 1913, Bull. Soc. Bot. France 60: 401, 402. 1913) records *Osbeckia rostrata* D. Don and *O. capitata* Benth., two Indian species, as occurring in Kweichow and Yunnan respectively. I have seen no Chinese specimens referable to these species and suspect that the plants designated as *O. capitata* Benth. by Guillaumin are included within the concept of *O. chinensis* L.

KEY TO THE CHINESE SPECIES

- A. Hairs on the calyx-tube stellate, pectinate, or branching.
 B. Anthers produced into a long beak; flowers 4-merous.
 C. Leaves narrow, less than 1.5 cm. broad. 1. *O. chinensis*.
 CC. Leaves wider, more than 2 cm. broad.
 D. Calyx covered with spreading stellate hairs. 2. *O. crinita*.
 DD. Calyx covered with appressed stellate or pectinate hairs. ... 3. *O. stellata*.
 BB. Anthers attenuate upward, not beaked; flowers 5-merous. ... 4. *O. nepalensis*.
 AA. Hairs on the calyx-tube simple. 5. *O. melastomatoides*.

1. *Osbeckia chinensis* L. Sp. Pl. 345. 1753; Lour. Fl. Cochinch. 228. 1790, ed. Willd. 281. 1793; DC. Prodr. **3**: 141. 1828; Hook. Bot. Mag. **69**: t. 4026. 1843; Benth. Fl. Hongk. 115. 1861; Triana, Trans. Linn. Soc. **28**: 53. 1871; Franch. Pl. David. **1**: 132. 1884; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 515. 1879; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 298. 1887; Guillaum. in Lecomte, Not. Syst. **2**: 308. 1913, Bull. Soc. Bot. France **60**: 402. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 874. 1921; Merr. Lingnan Sci. Jour. **5**: 138. 1927, Trans. Am. Philos. Soc. II. **24**(2): 288. 1935; Hand.-Maz. Symb. Sin. **7**: 597. 1933.

HUPEH: I-chang, A. Henry 2320 (G); western Hupeh, E. H. Wilson 2483 (N); Wuchang, S. C. Sun 878 (N). ANHWEI: Wu-yuan, R. C. Ching 8926 (G). KWEI-CHOW: Tuhshan, Y. Tsiang 6673 (A, G, N). SIKANG: Si-chang District, T. T. Yü 1249 (G); Hui-li District, T. T. Yü 1392 (G). YUNNAN: Mengtze, A. Henry 9942 (N); Tengyueh, C. Schneider 2612 (G); central Yunnan, J. F. Rock 6402 (G, N); Tali, C. Schneider 3058 (G), J. F. Rock 6631 (N); Fo-hai, C. W. Wang 77113 (A); Che-li Hsien, C. W. Wang 78710 (A), 79568 (A), 79882 (A); Mienning, T. T. Yü 17746 (A). KWANGSI: Hin Yen, Yeo Mar Shan, R. C. Ching 7255 (N); Yung District, Steward & Cheo 932 (G, N); Wait-sap District, W. T. Tsang 22733 (G). KIANGSI: Kiukiang, A. Allison 9 (G); Nanchang, T. N. Hsiung 495 (G); between Ningtu and Ki-an, Wang-Te-Hui 499 (A); Fengcheng, Y. Tsiang 10254 (N); Anyi, Y. Tsiang 10534 (N); Pai-shou District, Y. W. Taam 65 (A); Kien-nan District, S. K. Lau 4314 (G). KWANGTUNG: Hongkong, C. Wright s. n. (G, N); Canton, C. O. Levine 1174 (G), 1422 (G), 3016 (A), Y. Tsiang 1799 (N); Lin District, C. O. Levine 3414 (G); Wung-yuen District, S. K. Lau 2364 (G); Yang-shan District, T. M. Tsui 730 (N); Kao-yao District, S. Y. Lau 20173 (N); Ma Hou Ho, Shih Wan Tai Shan, H. Y. Liang 69544 (A); Hwei-yang District, Lin Fa Shan, W. T. Tsang 25688 (A). HAINAN: Fan Ta, F. A. McClure 9147 (A); Ching-mai District, C. I. Lei 639 (N), 807 (N); Dung Ka, N. K. Chun & C. L. Tso 43344 (N); Fan Yah, N. K. Chun & C. L. Tso 44005 (G, N); Yaichow, H. Y. Liang 62350 (N), F. C. How 70636 (N); Lam-ko District, W. T. Tsang 15736 (N), 17021 (G). FUKIEN: Kuliang Hills, J. B. Norton 1335 (G); Amoy, H. H. Chung 6127 (A).

Tropical Asia and Malaysia.

A common species, readily distinguished by its narrow leaves.

2. *Osbeckia crinita* Benth. apud Wall. List no. 4066. 1829, nom. nud.; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 517. 1879; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 299. 1887; Cogn. in DC. Monogr. Phan. **7**: 323. 1891; Pritzels, Bot. Jahrb. **29**: 484. 1900; Dunn & Tutchers, Kew Bull. Add. Ser. **10**: 106. 1912; Guillaum. in Lecomte, Not. Syst. **2**: 308. 1913, Bull. Soc. Bot. France **60**: 402. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 871. 1921; Rehd. & Wils. in Sargent, Pl. Wils. **2**: 421. 1915; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Hand.-Maz. Symb. Sin. **7**: 597. 1933; Rehd. Jour. Arnold Arb. **15**: 109. 1934.
- Osbeckia stellata* sensu Naud. Ann. Sci. Nat. III. Bot. **14**: 72. 1850; Hance, Jour. Bot. **16**: 107. 1878; non Wall.
- Osbeckia crinita* Benth. var. *yunnanensis* Cogn. in DC. Monogr. Phan. **7**: 324. 1891; Guillaum. in Lecomte, Not. Syst. **2**: 308. 1913; H. Lév. Fl. Kouy-Tchéou 277. 1914, Cat. Pl. Yun-Nan 176. 1916.
- Osbeckia yunnanensis* Franch. ex Cogn. in DC. Monogr. Phan. **7**: 324. 1891, pro syn.; Craib, Notes Bot. Gard. Edinb. **10**: 57. 1917.
- Melastoma Mairei* H. Lév. Repert. Sp. Nov. **11**: 300. 1912.
- Osbeckia Mairei* Craib, Notes Bot. Gard. Edinb. **10**: 54. 1917, syn. nov.
- Osbeckia robusta* Craib, l.c., syn. nov.

HUPEH: Western Hupeh, E. H. Wilson 2558 (A, N). HUNAN: Sin-ning District, C. S. Fan & Y. Y. Li 505 (A). KIANGSI: From Tsoongjen to Ihwang, Y. Tsiang 10001 (N); Ihwang, Y. Tsiang 10034 (N). SZECHUAN: Kiating, E. H. Wilson 3260 (A); Mt. Omei, W. P. Fang 2300 (A), Y. S. Liu 1011 (A), T. C. Peng 191 (A), C. Y. Chiao & S. C. Fan 38 (A); Han-yuan District, W. P. Fang 3766 (A). SIKANG:

Si-chang District, *T. T. Yü* 1223 (G); Ya-an, *C. Y. Chiao* 1208 (A). KWEICHOW: Kweiting, *Y. Tsiang* 5358 (A, N); Tsung-yi District, *Steward, Chiao & Cheo* 37 (N); Hsufeng, Lan-won-san, *S. W. Teng* 90593 (A). YUNNAN: No precise locality, *F. Ducloux* 475 (N), *J. C. Liu & C. Wang* 81806 (A), *M. K. Li* 2169 (A); Yungchang, *C. Schneider* 2559 (G); Mengtze, *A. Henry* 9978 (N); Szemao, *A. Henry* 12458 (A, N); Tchouan-se-pa, *E. E. Maire s. n.* (holotype of *Melastoma Mairei* H. Lév. and *Osbeckia Mairei* Craib, photo. and merotype, A); west of Tali, *J. F. Rock* 6366 (G); west of Mekong, *J. F. Rock* 6972 (A); Pi-tsieh District, *H. T. Tsai* 52761 (A); Tali, *H. T. Tsai* 53889 (A); Ping-pien District, *H. T. Tsai* 62422 (A); Shang-pa District, *H. T. Tsai* 58936 (A); Kengma, *T. T. Yü* 17279 (A). KWANGSI: Hin Yen, Tsin Hung Shan, *R. C. Ching* 6930 (N); Yung District, *Steward & Cheo* 919 (G, N); Wait-sap District, *W. T. Tsang* 22825 (G), 23264 (A); Ling-chuan District, *W. T. Tsang* 27864 (A); Kwei-lin District, *W. T. Tsang* 28098 (A); Pai-shou District, *Y. W. Taam* 28 (A). KWANGTUNG: Lienchow River, *C. Ford (Hongk. Herb.)* 1782 (A); Lungtou Shan, Shaochow, *H. Handel-Mazzetti* 704 (A); Canton, *C. O. Levine* 1789 (G); Yang-shan District, *T. M. Tsui* 663 (A, N); Wung-yuen District, *S. K. Lau* 2239 (A); Loh-chang District, *W. T. Tsang* 20756 (N); Shih Wan Tai Shan, *H. Y. Liang* 69667 (A). FUKIEN: Northern Fukien, near the Chekiang border, *R. C. Ching* 2261 (G).

India, Siam, Indo-China.

Guillaumin refers all the Chinese specimens to *Osbeckia crinita* var. *yunnanensis* Cogn., which Craib recognized as a species, *Osbeckia yunnanensis* Franch.; but I believe, with Handel-Mazzetti and Rehder, that there are no essential differences between the Indian and Chinese plants. Two of Craib's species are here reduced to synonymy, one, *Osbeckia Mairei* Craib, on the strength of a photograph and fragments of *E. E. Maire s. n.* from the Edinburgh herbarium, and another, *Osbeckia robusta* Craib, on the basis of the description alone. The latter was based on *G. Forrest* 8561, of which I have seen no specimen. Craib's description conforms to the characters of *Osbeckia crinita* Benth., which is widespread and more or less variable.

3. *Osbeckia stellata* Wall. List no. 4062. 1829, nom. nud.; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 517. 1879; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Hand.-Maz. Symb. Sin. **7**: 597. 1933.

Osbeckia crinita sensu Naud. Ann. Sci. Nat. III. Bot. **14**: 72. 1850, non Benth.

YUNNAN: No data, *H. T. Tsai* 59000 (A), 61397 (A); Shang-pa District, *H. T. Tsai* 54607 (A), 58822 (A), 58884 (A); Salween-Kiukiang Divide, *T. T. Yü* 20374 (A).

India, Siam.

Many authors, including Guillaumin (in Lecomte, Fl. Gén. Indo-Chine **2**: 871. 1921), consider this species as synonymous with *Osbeckia crinita* Benth., but if the above determinations are correct, it is certainly different from the latter. Clarke (l. c.) has clearly pointed out the confusion that has existed and the difference between the two species. *Osbeckia stellata* Wall., as I interpret it here, differs from *Osbeckia crinita* Benth. chiefly in the hairs covering the calyx-tubes being appressed, stellate, or pectinate in the former and spreading, long-stalked, and stellate in the latter.

4. *Osbeckia nepalensis* Hook. f. Exot. Fl. **1**: t. 31. 1823; DC. Prodr. **3**: 142. 1828; Triana, Trans. Linn. Soc. **28**: 55. 1871; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 521. 1879; Cogn. in DC. Monogr. Phan. **7**: 317. 1891; Guillaumin in Lecomte, Not. Syst. **2**: 307. 1913, Bull. Soc. Bot. France **60**: 401. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 868. 1921; Chung, Mem. Sci. Soc. China **1**: 185. 1924.

YUNNAN: Mengtze, *A. Henry* 11026 (A, N); Szemao, *A. Henry* 12309 (N); Luchang, *G. Forrest* 874 (A); from Pingpo to Youngchang and Tengyueh, *J. F. Rock* 7021 (N); between Tengyueh and Lungling, *J. F. Rock* 7092 (A); Chi-tze-lo, *H. T. Tsai* 54202 (A); Ping-pien District, *H. T. Tsai* 61505 (A); Che-li District, *C. W. Wang* 79451 (A); no data, *M. K. Li* 1701 (A). KWANGSI: Lin-yen, *R. C. Ching* 6762 (A).

India, Siam, Indo-China.

This is distinguished from the other Chinese species by its pentamerous flowers.

5. *Osbeckia melastomatoides* Merr. & Chun, *Sunyatsenia* 2: 293. 1931.

HAINAN: Mo San Ling, *N. K. Chun & C. L. Tso* 44310 (ISOTYPE, A); Po-ting, *F. C. How* 72029 (A); no precise locality, *C. Wang* 34643 (N), 35035 (N), 35861 (A, N), *H. Y. Liang* 64180 (A, N), 64182 (A, N).

This is apparently an anomalous species. Merrill and Chun mention that "In general aspects this strongly resembles various species of *Melastoma*, but by its floral and fruit characters is an *Osbeckia*. It does not seem to be closely allied to any previously described form." The straight seeds and the concave 4-valved fruit suggest the tribe Sonerileae but I cannot refer it to any genus of that tribe. The general appearance of the plant is strongly indicative of the Melastomatoideae.

2. MELASTOMA

Melastoma Linnaeus, Sp. Pl. 389. 1753.

- A. Calyx provided with simple appressed hairs.
- B. Young stems glabrous or with short appressed hairs; leaves small, generally less than 5 cm. long; calyx-hairs appressed.
 - C. Leaves glabrous above or with a row of hairs along the margins only. 1. *M. dodecandrum*.
 - CC. Leaves covered with short patent hairs all over above.
 - D. Calyx more or less densely covered with hairs, the teeth 9×1.5 mm. 2. *M. intermedium*.
 - DD. Calyx sparsely covered with hairs, the teeth 7×2.5 mm. 3. *M. suffruticosum*.
- BB. Young stems densely or sparsely covered with long harsh hairs, their bases spreading; leaves large, 10-15 cm. long or more; calyx-hairs long, spreading.
 - C. Hairs on young stems and calyx very dense; leaves densely hairy on both surfaces. 4. *M. penicillatum*.
 - CC. Hairs on young stems very sparse; leaves nearly glabrous beneath. 5. *M. sanguineum*.
- AA. Calyx provided with scales or long branching or denticulate hairs.
 - B. Hairs on stems long, spreading; leaf-base narrow, rounded to acute, 3-5-nerved; calyx densely covered with long or scale-like denticulate hairs. 6. *M. normale*.
 - BB. Hairs on stems short, scaly, more or less appressed.
 - C. Leaves densely long-pubescent beneath; leaf-base cordate, 5-7-nerved; calyx-hairs long, denticulate. 7. *M. candidum*.
 - CC. Leaves short-pubescent beneath; leaf-base narrow, acute to attenuate, 3-5-nerved; calyx-hairs long or scaly. 8. *M. polyanthum*.

1. *Melastoma dodecandrum* Lour. Fl. Cochinch. 274. 1790, ed. Willd. 336. 1793; Hand.-Maz. Symb. Sin. 7: 597. 1933; Merr. Trans. Am. Philos. Soc. II. 24(2): 287. 1935.

Melastoma repens Desr. in Lam. Encycl. 4: 54. 1796; Hance, Jour. Bot. 7: 296. 1869; Triana, Trans. Linn. Soc. 28: 58. 1871; Benth. Fl. Hongk. 113. 1861; Forbes & Hemsl. Jour. Linn. Soc. Bot. 23: 300. 1887; Cogn. in DC. Monogr.

Phan. **7**: 344. 1891; Guillaum. in Lecomte, Not. Syst. **2**: 317. 1913, Bull. Soc. Bot. France **60**: 402. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 886. 1921; Chung, Mem. Sci. Soc. China **1**: 185. 1924.

KIANGSI: Lingchuan, *Y. Tsiang* 9856 (N); Kien-nan District, *S. K. Lau* 3990 (A). KWEICHOW: Kweiting, *Y. Tsiang* 5437 (N); Tuhshan, *Y. Tsiang* 6594 (N). HUNAN: Chang-ning District, *C. S. Fan & Y. Y. Li* 2 (G). KWANGSI: South of Nanning, Shih Wan Tai Shan, *R. C. Ching* 8022 (N); Yung District, *Steward & Cheo* 735 (A, N); Shang-sze District, Shih Wan Tai Shan, *W. T. Tsang* 22331 (A, G), 22496 (A). KWANGTUNG: Hongkong, *O. Kuntze* 3566 (N), *C. Wright s. n.* (G, N), *Hance* 670 (G); Lofaushan, *C. Ford s. n.* (N); Honam Island, *C. O. Levine* 723 (G); Kochow, *Y. Tsiang* 2261 (N); Yang-shan District, *T. M. Tsui* 549 (N); Lohchang, *C. L. Tso* 21007 (A, N), *W. T. Tsang* 20860 (N); Wung-yuen District, *S. K. Lau* 2080 (G); Lingnan Campus, *W. T. Tsang* 19065 (N); Tseng-shing District, *W. T. Tsang* 20401 (N); Ta-pu District, *W. T. Tsang* 21024 (A, N); Lung-men District, *W. T. Tsang* 25346 (A); Hai-fung District, *W. T. Tsang* 25591 (A). FUKIEN: Foochow, *Dunn (Herb. Hongk.)* 2705 (A); Kushan, *H. H. Chung* 3737 (A); Amoy, *H. H. Chung* 1703 (A), 4958 (A); Yenping, *H. H. Chung* 2824 (A), 3465 (A), 3621 (A); Kuliang, *H. H. Chung* 6433 (A). CHEKIANG: Tientai Shan, *C. Y. Chiao* 1492 (N).

Indo-China.

A common and distinct species, well characterized by its small ovate leaves, which are almost totally glabrous. In habit it is very unlike all of the other species, being a low spreading plant, while the others are all erect shrubs.

2. *Melastoma intermedium* Dunn, Jour. Linn. Soc. Bot. **38**: 360. 1908; Guillaum. in Lecomte, Not. Syst. **2**: 317. 1913, Bull. Soc. Bot. France **60**: 402. 1913; Chung, Mem. Sci. Soc. China **1**: 185. 1924.

FUKIEN: Yengping, *Dunn (Hongk. Herb.)* 2706 (ISOTYPE, A); Foochow, Kuliang, *J. B. Norton* 1333 (G, A), *H. H. Chung* 6769 (A, N); Minchow, *H. H. Chung* 2745 (A). Known only from Fukien Province.

3. *Melastoma suffruticosum* Merr. Lingnan Sci. Jour. **14**: 42. 1935.

KWANGSI: Nanning to Shang-sze, *R. C. Ching* 7771 (A). HAINAN: Ngai District, *S. K. Lau* 247 (ISOTYPE, A); Kumyun, *S. K. Lau* 27841 (A); Yaichow, *H. Y. Liang* 62880 (A, N), *N. K. Chun & C. L. Tso* 44797 (A, N). As yet unrecorded from elsewhere.

4. *Melastoma penicillatum* Naud. Ann. Sci. Nat. III. Bot. **13**: 280. 1849; Cogn. in DC. Monogr. Phan. **7**: 346. 1891; Merr. Enum. Philip. Fl. Pl. **3**: 187. 1923; Merr. & Chun, Sunyatsenia **5**: 145. 1940.

HAINAN: No precise locality, *C. Wang* 35716 (A, N), *H. Y. Liang* 64392 (N), 64761 (N); Yai District, *S. K. Lau* 6321 (A); Bak Sa, *S. K. Lau* 25889 (A).

Philippines.

A distinct species, characterized by the dense, long, harsh, more or less purplish hairs covering the young branches and the calyces.

5. *Melastoma sanguineum* Sims, Bot. Mag. **48**: t. 2241. 1821; DC. Prodr. **3**: 145. 1828; Triana, Trans. Linn. Soc. **23**: 60. 1871; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 524. 1879; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 300. 1887; Chung, Mem. Sci. Soc. China **1**: 185. 1924.

Melastoma decemfidum Roxb. Hort. Beng. 90. 1814, nom. nud., Fl. Ind. **2**: 406. 1824; Jack, Trans. Linn. Soc. **14**: 6. 1823; DC. Prodr. **3**: 146. 1828; Benth. Fl. Hongk. 114. 1861; Cogn. in DC. Monogr. Phan. **7**: 345. 1891; Guillaum. in Lecomte, Not. Syst. **2**: 315. 1913, Bull. Soc. Bot. France **60**: 402. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 883. 1921; Merr. Lingnan Sci. Jour. **5**: 138. 1927.

KWANGSI: Shih Wan Tai Shan, *R. C. Ching* 7820 (A, N), 8051 (A), *W. T. Tsang* 22462 (A), 22522 (A), 23843 (A, N). KWANGTUNG: Hongkong, *C. Wright* s. n. (G), *E. Faber* s. n. (N), *C. S. Sargent* s. n. (A), *W. Y. Chun* 5025 (A), *Y. Tsiang* 277 (A); Kowloon, *T. N. Liou* 705 (N); Canton, *E. Faber* s. n. (A, N), *C. O. Levine* 1663 (G), 1937 (G, A); Ting-wu Shan, *C. O. Levine* 90 (A), *W. Y. Chun* 6393 (A), *H. T. Ho* 60023 (N); Wong Lan To, *F. A. McClure* 7189 (A); Kao-yao District, *S. Y. Lau* 20197 (N); Luichow, Pon-tan, *Y. Tsiang* 2565 (A); Hwei-yang District, *W. T. Tsang* 25663 (A), 25811 (A). HAINAN: No precise locality, *C. Wang* 32782 (N), 32799 (N), 34147 (N), 36117 (N), 36268 (N), *H. Y. Liang* 63333 (A, N), 64467 (N), 65032 (N); Nodoua, *F. A. McClure* 8042 (A); Tan District, *S. K. Lau* 1077 (A, N); Chang-kiang District, *S. K. Lau* 3106 (A); Kan-en District, *S. K. Lau* 3427 (A), 5110 (A); Po-ting, *P. S. Lo* 62405 (A, N); Ching-mai District, *C. I. Lei* 178 (N), 710 (N); Yaichow, *H. Y. Liang* 62005 (N), 62405 (N), *F. C. How & N. K. Chun* 70267 (N); Dam-ka, *N. K. Chun & C. L. Tso* 43420 (N); Lam-ko District, *W. T. Tsang* 15670 (A, N); Lai Area, Hung Mo Shan, *Tsang, Tang & Fung* 17588 (A, N).

Indo-China, Malay Peninsula, Java, Sumatra, Borneo.

6. *Melastoma normale* D. Don, Prodr. Fl. Nepal. 220. 1825; DC. Prodr. **3**: 145. 1828; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 524. 1879; Cogn. in DC. Monogr. Phan. **7**: 352. 1891; Guillaum. in Lecomte, Not. Syst. **2**: 319. 1913, Bull. Soc. Bot. France **60**: 402. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 889. 1921; H. Lév. Fl. Kouy-Tchéou 227. 1914, Cat. Pl. Yun-Nan 176. 1916; Rehd. & Wils. in Sargent, Pl. Wils. **2**: 241. 1915; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Merr. Lingnan Sci. Jour. **5**: 138. 1927; Hand.-Maz. Symb. Sin. **7**: 596. 1933; Rehd. Jour. Arnold Arb. **15**: 109. 1934.

Melastoma Cavaleriei H. Lév. Repert. Nov. Sp. **3**: 21. 1906.

Melastoma Esquirolii H. Lév. Repert. Sp. Nov. **8**: 61. 1910.

SZECHUAN: No precise locality, *A. Henry* 8976 (G); *E. H. Wilson* 3259 (A, G), 4907 (A); banks of the Yangtze River, *E. H. Wilson* 3648 (A); Ki-kiang District, *W. P. Fang* 1292 (A), Lo-shan District, *W. P. Fang* 2286 (A). YUNNAN: No precise locality, *G. Forrest* 7510 (A), 9831 (A), *H. T. Tsai* 55842 (A); Mengtze, *A. Henry* 10954 (A, N); Manhao, *H. Handel-Mazzetti* 5846 (A); Kien-shuei District, *H. T. Tsai* 53059 (A); Shih-ping District, *H. T. Tsai* 53358 (A); Ping-pien District, *H. T. Tsai* 55123 (A), 62127 (A); Lung-ling District, *H. T. Tsai* 55708 (A), 55781 (A); Mong-ka, *H. T. Tsai* 56449 (A); Lu-se, *H. T. Tsai* 56954 (A); Chen-kang District, *C. W. Wang* 72546 (A). KWANGSI: I-shan, *R. C. Ching* 5172 (A, N); Lin-yuin District, *A. N. Steward & C. C. Cheo* 561 (N); Yao Shan, Pin Nan, *C. Wang* 39175 (A); Sui-luk District, *W. T. Tsang* 21898 (A); Shang-sze District, *W. T. Tsang* 21993 (A), 22198 (A). KWANGTUNG: Ting-wu Shan, *W. Y. Chun* 6294 (A); Tung-koon District, *S. Y. Lau* 20008 (N); Tsing-yun District, *Y. F. Chun* 30481 (N); Chung-shan District, *W. T. Tsang* 19260 (N); Ho-yuen District, *W. T. Tsang* 28714 (A), 58635 (A).

Formosa, Indo-China, Siam, Borneo, and the Philippines to the New Hebrides.

In the herbarium this species is sometimes confused with *Melastoma candidum* D. Don. It may be distinguished from the latter by its long, spreading hairs instead of short, scaly, more or less appressed ones on the stem, and the narrow, rounded to acute instead of cordate leaf-bases.

7. *Melastoma candidum* D. Don, Mem. Wern. Soc. **4**: 288. 1823; DC. Prodr. **3**: 145. 1828; Benth. in Hook. Kew Jour. Bot. **4**: 116. 1852; Triana, Trans. Linn. Soc. **28**: 60. 1871; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 299. 1887; Cogn. in DC. Monogr. Phan. **7**: 348. 1891; Guillaum. in Lecomte, Not. Syst. **2**: 313. 1913, Bull. Soc. Bot. France **60**: 402. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 880. 1921; Chung, Mem. Sci. Soc. China **1**: 184. 1924.

Melastoma septemnerium Lour. Fl. Cochinch. 273. 1790, ed. Willd. 335. 1793; Merr. Lingnan Sci. Jour. **5**: 138. 1927, Trans. Am. Philos. Soc. II. **24**(2): 287. 1935; non Jacq. (1760).

Melastoma macrocarpon sensu Benth. Fl. Hongk. 113. 1861, non D. Don.

KWANGTUNG: Hongkong, *C. Wright* s. n. (G, N), *Ford* s. n. (A), *C. S. Sargent* s. n. (A), *W. T. Brigham* s. n. (G); Kowloon, *T. N. Liou* 727 (N); Whampoa, *S. Williams* s. n. (G); Canton, *C. O. Levine* 783 (A, G); Ting-wu Shan, *Levine & Groff* 38 (A); Heung Shan, *W. Y. Chun* 12 (N); Kochow, *Y. Tsiang* 2081 (N); Lofaushan, *S. P. Ko* 50048 (N); Kao-yao District, *S. Y. Lau* 20271 (A, N); Ma Hou Ho, *H. Y. Liang* 69572 (A); Taai Ue Shan, *W. T. Tsang* 16528 (A); Ta-pu District, *W. T. Tsang* 21608 (A); Hwei-yang District, *W. T. Tsang* 25852 (A). KWANGSI: Hin Yen, *R. C. Ching* 6965 (A, N); Poseh, Bako Shan, *R. C. Ching* 7417 (A); Nanning to Shang-sze, *R. C. Ching* 7756 (A); Shang-sze District, *W. T. Tsang* 23882 (A, N), 23965 (A, N), 24530 (A, N). HAINAN: No precise locality, *A. Henry* s. n. (G), *C. Wang* 32831 (N), 35225 (N); southern slope of Five Fingers Mt., *F. A. McClure* 9410 (A); Ling-shui District, *S. K. Lau* 1 (A, N); Chang-kang District, *S. K. Lau* 1907 (A, N), *C. I. Lei* 665 (A, N), 676 (N), 879 (N); Yaichow, *F. C. How* 70552 (A, N), *H. Y. Liang* 62384 (N); Po-ting, *S. P. Ko* 52158 (A, N), *F. C. How* 71930 (A), 72840 (A); Dung Ka, *N. K. Chun & C. L. Tso* 43428 (A, N); Taam-chau District, *W. T. Tsang* 17172 (A); Lam-ko District, *W. T. Tsang* 15826 (A, N); Ching-mai District, *C. I. Lei* 636 (N). FUKIEN: No precise locality, *H. H. Chung* 5091 (N), 7796 (N); Yengping, *Dunn* (*Hongk. Herb.*) 2704 (A); Kuliang Hills, *J. B. Norton* 1334 (A); Minchow, *H. H. Chung* 2469 (A), 2744 (A).

Formosa, Indo-China.

The name *Melastoma septemnervium* Lour. is invalidated because of the earlier *M. septemnervium* Jacq. (1760) of the West Indies.

8. *Melastoma polyanthum* Blume, Flora 2: 481. 1831, Mus. Bot. Lugd.-Bat. 1: 55. t. 6. 1849; C. B. Clarke in Hook. f. Fl. Brit. Ind. 2: 523. 1879; Cogn. in DC. Monogr. Phan. 7: 354. 1891; Guillaum. in Lecomte, Not. Syst. 2: 322. 1913, Bull. Soc. Bot. France 60: 403. 1913, et in Lecomte, Fl. Gén. Indo-Chine 2: 893. 1921; Chung, Mem. Sci. Soc. China 1: 185. 1924.

SZCHUAN: Kiating, *S. S. Chien* 5985 (A); Omei Shan, *Y. S. Liu* 1025 (A). YUNNAN: Szemao, *A. Henry* 11712 (A, N), 11712A (A), *J. F. Rock* 2701 (A), 2815 (A); Shung-kiang District, *C. W. Wang* 72977 (A); Nan-chiao, *C. W. Wang* 75023 (A); Fo-hai, *C. W. Wang* 76099 (A); Shun-ning, *T. T. Yü* 15937 (A). KWANGSI: Ling-yuin District, *Steward & Cheo* 561 (A); south of Nanning, Shih Wan Tai Shan, *R. C. Ching* 7909 (A, N); Ling-wun District, *S. K. Lau* 28780 (A); Shing-an District, *Z. S. Chung* 81831 (A). KWANGTUNG: Honam Island, *C. O. Levine* 491 (A); Wat Shui Shan, *W. Y. Chun* 7374 (A); San-on District, *T. M. Tsui* 271 (A, N); Sin-fung District, *Y. W. Taam* 848 (A); Ta-pu District, *W. T. Tsang* 21173 (A, N), 21608 (N); Lung-men District, *W. T. Tsang* 25338 (A), 25435 (A). HAINAN: Ching-mai District, *C. I. Lei* 127 (N), 477 (N); Kan-en District, *S. K. Lau* 3587 (A); Lam-ko District, *W. T. Tsang* 15674 (A, N).

Indo-China, Siam, Malay Peninsula, Australia.

The Chinese specimens agree well with specimens representing Blume's species from tropical Asia and Malaysia, except that they have longer and more prominent calyx-lobes; they apparently represent a form of the species.

3. PLAGIOPETALUM

Plagiopetalum Rehder in Sargent, Pl. Wils. 3: 452. 1917.

The genus *Plagiopetalum*, when described by Rehder, was placed in the Sonerileae with supposed relationships to *Fordiophyton* and *Sonerila*. Diels (Bot. Jahrb. 65: 99-100. 1932) includes it in the Oxysporeae, which position I accept.

A. Leaves 3-nerved.1. *P. Esquirolii*.

AA. Leaves 5-nerved.2. *P. hainanense*.

1. **Plagiopetalum Esquirolii** (H. Lév.) Rehd. Jour. Arnold Arb. **15**: 110. 1934; Chun, Sunyatsenia **4**: 192. 1940; Merr. Brittonia **4**: 127. 1941.

Sonerila Esquirolii H. Lév. Bull. Soc. Bot. France **54**: 368. 1907, Repert. Sp. Nov. **11**: 494. 1913.

Barthea Cavalieriei H. Lév. Repert. Sp. Nov. **8**: 61. 1910, pro parte.

Barthea Blinii H. Lév. Repert Sp. Nov. **11**: 494. 1913.

Allomorpha Blinii Guillaum. Bull. Soc. Bot. France **60**: 87, 403. 1913; H. Lév. Fl. Kouy-Tchéou 276. 1914.

Plagiopetalum quadrangulum Rehd. in Sargent, Pl. Wils. **3**: 453. 1917; Chung, Mem. Sci. Soc. China **1**: 185. 1924.

Sonerila Henryi Kränzl. Viert. Nat. Ges. Zürich **76**: 152. 1931, syn. nov.

Plagiopetalum serratum Diels, Bot. Jahrb. **65**: 100. 1932.

SZETCHUAN: Hung-ya District, *Wilson* 3261 (A); Ma-pien District, *F. T. Wang* 23602 (A). KWEICHOW: Nakan, Chengfeng, *Y. Tsiang* 4581 (N); no precise locality, *Y. Tsiang* 9344 (A). YUNNAN: Mengtze, *A. Henry* 9077 (isotype of *Sonerila Henryi* Kränzl., A, N), 9077B (A), 9077C (A), 9077D (N); south of Red River, *A. Henry* 9721 (A, N); Szemao, *A. Henry* 13520 (N); no locality, *G. Forrest* 12006 (A); west of Tali, *J. F. Rock* 6926 (A, N); Pingpo to Tengyueh, *J. F. Rock* 7000 (A), 7015 (A); Champutong, *J. F. Rock* 11514 (A), *C. W. Wang* 67009 (A), 67337 (A); Cheng-kang District, *C. W. Wang* 72176 (A); Keng-ma, *T. T. Yü* 17282 (A); Kiukiang Valley (Taron), *T. T. Yü* 19488 (A); Wen-shan District, *H. T. Tsai* 51569 (A); Shang-pa District, *H. T. Tsai* 56606 (A); Ping-pien District, *H. T. Tsai* 62394 (A), 62559 (A). KWANGSI: Ching Sai Village, *S. P. Ko* 55696 (A); Ling-wun District, *S. K. Lau* 28650 (A).

Upper Burma.

This species has acquired a long list of synonyms over a period of only 25 years, to which another, *Sonerila Henryi* Kränzl., is now added. The species is quite variable and herbarium specimens are frequently mis-determined.

2. **Plagiopetalum hainanense** (Merr. & Chun) Merrill in herb. comb. nov.

Bredia hainanensis Merr. & Chun, Sunyatsenia **5**: 145. t. 22. 1940.

HAINAN: Po-ting, *F. C. How* 72967 (HOLOTYPE, A); Bak Sa, *S. K. Lau* 26587 (A).

This is the second species of the genus and also a new generic record for Hainan. The Hainan species is closely allied to *Plagiopetalum Esquirolii* (H. Lév.) Rehd., differing chiefly in the relatively broader, more or less distinctly 5-nerved instead of 3-nerved leaves.

4. ALLOMORPHIA

Allomorpha Blume, Flora **14**: 522. 1831.

1. **Allomorpha Balansaei** Cogn. in DC. Monogr. Phan. **7**: 1183. 1891; Guillaum. in Bull. Soc. Bot. France **60**: 87. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 901. 1921; Diels, Bot. Jahrb. **65**: 102. 1932.

KWANGSI: South of Nanning, Shih Wan Tai Shan, *R. C. Ching* 7878 (N); Shang-sze District, Shih Wan Tai Shan, *W. T. Tsang* 22673 (A), 23896 (A, N), 24315 (A, N); Yao Shan, *C. Wang* 39927 (A); Ping-nan District, *C. Wang* 40425 (A).

KWANGTUNG: Tai Mien Shan, Shih Wan Tai Shan, *H. Y. Liang* 69668 (A). HAINAN: No precise locality, *C. Wang* 35614 (N); Yaichow, *H. Y. Liang* 63063 (A, N); Loktung, *S. K. Lau* 27308 (A), 26984 (A).

Indo-China.

2. **Allomorpha urophylla** Diels, Bot. Jahrb. **65**: 102. 1932.

YUNNAN: Mengtze, *A. Henry* 9769 (A, N), 9769A (ISOTYPE, A), 11448 (isopara-

type, A, N), 11448A (A, N); Wen-shan District, *H. T. Tsai* 51789 (A), Tsing-pien District, *H. T. Tsai* 52453 (A), 52601 (A); Ping-pien District, *H. T. Tsai* 61656 (A), 61118A (A). Endemic.

3. *Allomorpha setosa* Craib, Kew Bull. 1913: 68. 1913; Guillaum. Bull. Soc. Bot. France 60: 403. 1913, et in Lecomte, Fl. Gén. Indo-Chine 2: 900. 1921.

Oxyspora Howellii J. F. Jeffrey & W. W. Smith, Notes Bot. Gard. Edinb. 9: 114. 1916, syn. nov.

Allomorpha Howellii Diels, Bot. Jahrb. 65: 102. 1932, syn. nov.

YUNNAN: Szemao, *A. Henry* 12993 (isotype, A); between Muang Hing and Maliping, *J. F. Rock* 2741 (A); Kiukiang Valley (Taron), *T. T. Yü* 20168 (A); Che-li District, *C. W. Wang* 78331 (A), 79696 (A); Jenn-yeh District, *C. W. Wang* 80132 (A), 80734 (A), 80832 (A).

Siam.

A species well characterized by the setose hairs present on the stems, petioles, and inflorescences.

Diels correctly transferred *Oxyspora Howellii* J. F. Jeffrey & W. W. Smith to *Allomorpha*, but he apparently overlooked *Allomorpha setosa* Craib of Siam and Yunnan. *Oxyspora Howellii*, on the basis of its original description, manifestly represents the same species as *A. setosa* Craib.

4. *Allomorpha flexuosa* Hand.-Maz. Sinensia 3: 195. 1933.

Described from *R. C. Ching* 7012 from Ling-yen, Kwangsi; no specimen seen.

5. *Allomorpha caudata* (Diels) comb. nov.

Anerincleistus ? *caudatus* Diels, Bot. Jahrb. 65: 101. 1932.

YUNNAN: Mengtze, *A. Henry* 10761 (ISOTYPE, A); Ping-pien District, *H. T. Tsai* 60437 (A), 60563 (A), 61279 (A), 61591 (A). Endemic.

Diels doubtfully assigns this very striking plant to *Anerincleistus*, as fruits were lacking on his Henry specimens. Fruits are now known from *Tsai* 61279 and 61591, and, as they conform to those of *Allomorpha*, I therefore transfer the species to this genus. The long spicate inflorescences and the densely tomentose leaves are very characteristic. The somewhat immature fruits are globose to subglobose, about 2.5 mm. in diameter, hirsute, strongly 8-nerved, one-celled, many-seeded; seeds very minute, oblong, about 0.5 mm. long.

5. CYPOTHECA

Cypotheca Diels, Bot. Jahrb. 65: 103. 1932.

1. *Cypotheca montana* Diels, Bot. Jahrb. 65: 103. 1932.

YUNNAN: Mengtze, *A. Henry* 10655 (ISOTYPE, A); Kien-shuei District, *H. T. Tsai* 53115 (A); Tsang-yuan, *C. W. Wang* 73206 (A); Shun-ning, *T. T. Yü* 16241 (A), 16627 (A). Endemic.

In addition to the type, the four numbers from recent collections as listed above are referable to Diels' new genus. The fruit was unknown to him. *Yü* 16627 is a specimen in young fruit. The fruit is completely enclosed by the calyx-tube, which is turbinate, about 6 mm. long and 5 mm. wide, and slightly furfuraceous on the outside. The capsule is 4-valved at the tip and slightly acute. The seeds are numerous and minute.

6. OXYSPORA

Oxyspora DeCandolle, Prodr. 3: 123. 1828.

In addition to the well known species *Oxyspora paniculata* DC., two new ones are here added which may be differentiated by the following key:

- A. Plants more or less hairy on the branches; leaf-bases broadly acute to rounded or cordate, with a tuft of hairs on the upper surface at the base where the petiole joins the leaf.
 - B. Leaf-bases subcordate to cordate; leaves more or less stellate-pubescent beneath.1. *O. paniculata*.
 - BB. Leaf-bases broadly acute to rounded; leaves glabrous beneath.2. *O. yunnanensis*.
- AA. Plants essentially glabrous; leaf-bases acute to subrounded, with a small basal tuft of hairs.3. *O. glabra*.

1. *Oxyspora paniculata* DC. Prodr. **3**: 123. 1828, Mém. Mést. 33. t. 4. 1828; Wall. Pl. As. Rar. **1**: t. 88. 1830; Triana, Trans. Linn. Soc. **28**: t. 62a. 1871; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 525. 1879; Cogn. in DC. Monogr. Phan. **7**: 471. 1891; H. Lév. Cat. Pl. Yun-Nan 176. 1916; Guillaum. Bull. Soc. Bot. France **60**: 404. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 907. 1921; Diels, Bot. Jahrb. **65**: 104. 1932; Hand.-Maz. Symb. Sin. **7**: 597. 1933; Rehd. Jour. Arnold Arb. **15**: 110. 1934; Chun, Sunyatsenia **4**: 192. 1940.

Bredia soneriloides H. Lév. Repert. Sp. Nov. **9**: 21. 1910.

Sonerila Cavalieriei H. Lév. l.c. pro syn. *Bredia soneriloides*; op. cit. **11**: 494. 1913.

YUNNAN: Mengtze, A. Henry 9010 (A, N), 9010B (N), 11284 (A, N); Szemao, A. Henry 12508 (A), 12508A (A), C. Schneider 2554 (A); Mopo, J. F. Rock 2901 (A); no precise locality, G. Forrest 7677 (A), 7680 (A); from Pingpo to Yung-chang, J. F. Rock 7025 (A); Chugai, J. F. Rock 2997 (A); Wen-shan District, H. T. Tsai 51470 (A), 51600 (A); Chi-tze-lo, H. T. Tsai 54260 (A); Shang-pa, H. T. Tsai 54754 (A), 58905 (A), 58971 (A); Lung-ling District, H. T. Tsai 55009 (A); Lu-se District, H. T. Tsai 56929 (A); Ping-pien District, H. T. Tsai 60937 (A), 61470 (A), 62287 (A); Shun-ning District, C. W. Wang 71869 (A); Cheng-kang District, C. W. Wang 72525 (A); Keng-ma, C. W. Wang 72899 (A); Jenn-yeh District, C. W. Wang 80381 (A), 80756 (A); Kiukiang Valley (Taron), T. T. Yü 20196 (A); no precise locality, J. C. Liu & C. Wang 82743 (A). KWEICHOW: No locality, S. W. Teng 91064; Chengfeng, S. W. Teng 90935 (A); Lolu, Y. Tsiang 7209 (A, N). KWANGSI: East of Lin-yen, Lau Lon, R. C. Ching 6642 (A); Wei-chen, south of Hoo-chi, R. C. Ching 6648 (A); Ching Sai, S. P. Ko 55517 (A); Ling-yuin District, S. K. Lau 28595 (A).

India, Indo-China.

Some of the specimens have been referred to as *Oxyspora cernua* Hook. f. & Thomson, but I fail to note any constant difference between these two supposedly distinct species; nor is there any clear distinction indicated in the published description of Hooker f. & Thomson's species.

2. *Oxyspora yunnanensis* sp. nov.

Frutex circiter 1–1.75 m. altus, ramulis brunneis teretibus hirsuto-ciliatis; foliis chartaceis petiolatis oppositis inaequalibus vel aequalibus, glabris laminae basi ciliata excepta, oblongo-ovatis, 6–11 cm. longis, 2.5–4.2 cm. latis, supra viridibus, subtus paulo pallidioribus, acuminatis, basi late acutis vel rotundatis, 5-plinerviis, margine minute denticulatis vel subintegris, venis transversis utrinque subconspicuis; petiolo 0.5–1.3 cm. longo glabro canaliculato; inflorescentiis terminalibus paniculatis, 11–21 cm. longis, 6–7 cm. latis, glabris vel rarius parce ciliatis, pedicellis circiter 5 mm. longis, bracteis minutis linearibus 1.5–2.5 cm. longis, acuminatis; calycibus cupuliformibus, circiter 6 mm. longis, glabris, margine 4-dentatis, dentibus late triangularibus, 1.5 mm. longis; petalis 4, ovatis, circiter 10 mm. longis et 6 mm. latis, apice longe ciliato-acuminatis; staminibus 8: 4 violaceis longi-

oribus, antheris 8-9 mm. longis, filamentis 4-5 mm. longis; 4 luteis brevioribus, antheris circiter 4 mm. longis, filamentis 3-4 mm. longis, connectivo haud appendiculato; ovario inferiore, 4-loculari, stylo 1 cm. longo, stigmate inconspicuo; capsulis ellipticis, circiter 1 cm. longis et 5 mm. latis, 8-costatis; seminibus numerosis minutis.

YUNNAN: Kiukiang Valley, Chiengen, *T. T. Yü 19913* (TYPE, A), Aug. 20, 1938, a shrub 4 ft. high, among thickets, casual, alt. 1700 m., flowers rosy pink; Kiukiang Divide, Sochieh, *T. T. Yü 20850* (A), Oct. 26, 1938, a shrub 5 ft. high, margin of woods, common, alt. 1600 m., capsules greenish brown; Champutong, Bar-ru-lah, Salween-Kiukiang Divide, *C. W. Wang 67488* (A), Oct. 1935, under forest, alt. 2800 m., fruit green.

A species well characterized by its relatively small, ovate-oblong, glabrous leaves and long, narrow, and almost totally glabrous inflorescences save a few ciliate hairs occasionally found on the main axis.

3. *Oxyspora glabra* sp. nov.

Frutex glaber, circiter 1.5 m. altus, ramulis gracilibus teretibus brunneis ultimis 1.5 mm. diametro; foliis membranaceis petiolatis oppositis inaequalibus lanceolato-oblongis, 7.5-14 cm. longis, 3-4.2 cm. latis, glabris basi leviter ciliata excepta, longe acuminatis, basi acutis vel subrotundatis, margine minute denticulatis vel subintegris, 5-nerviis, nervis transversis supra subconspicuis, subtus distinctis; petiolo gracili 1-2 cm. longo glabro canaliculato; floribus ignotis; infructescentiis terminalibus paniculatis circiter 12 cm. longis et 4 cm. latis, pedicellis circiter 1 cm. longis, recurvis, capsulis ovoideis, circiter 7 mm. longis et 4 mm. latis, 8-costatis; seminibus falcatis numerosis minutis.

YUNNAN: Shang-pa District, *H. T. Tsai 56640* (TYPE, A), Sept. 27, 1933, a small shrub 5 ft. high, on open slope, alt. 2100 m.

A species characterized by its totally glabrous habit except a small tuft of ciliated hairs at the base of the leaf-blade, the long narrow membranaceous leaves, and the rather small and narrow panicles of fruits.

7. BARTHEA

Barthea Hooker f. in Benth. & Hook. f. Gen. Pl. **1**: 751. 1867.

The genus *Barthea* is well characterized by its bisetose anthers and 4-angled fruits. There are two species in the genus, one in Formosa and one in southern China.

1. *Barthea Barthei* (Hance) Krasser in Engl. & Prantl, Nat. Pflanzenfam. **3**(7): 175. 1893.

Dissochaeta Barthei Hance in Benth. Fl. Hongk. 115. 1861, Jour. Linn. Soc. Bot. **8**: 103. 1867.

Barthea chinensis Hook. f. in Benth. & Hook. f. Gen. Pl. **1**: 751. 1867; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 300. 1887; Guillaum. Bull. Soc. Bot. France **60**: 404. 1913; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Metcalf, Lingnan Sci. Jour. **12**: 155. 1933; Diels, Bot. Jahrb. **65**: 104. 1932.

KWANGSI: Me-kon, Shih Wan Tai Shan, south of Nanning, *R. C. Ching 8436* (A, N); Yao Shan, Tseungyuen, *C. Wang 39448* (A); Shang-sze District, Shih Wan Tai Shan, *W. T. Tsang 22372* (A), *22566* (A), *24306* (A, N), *24379* (A, N), *24619* (A, N), *24746* (A, N). KWANGTUNG: Taimoshan, *Hongk. Herb. 7039* (A); Hongkong, *Willford s. n.* (G), *Y. Tsiang 41* (A, N), *N. K. Chun 40153* (N); Lofaushan, *Herb. Bur. Sci. Manila 10992* (N); Canton Christian Coll. *6890* (N); Pan Ling Tsze, *W. Y. Chun 5943* (A); Shih Wan Tai Shan, *C. L. Tso 23570* (N).

The accepted name is almost but not quite a duplicate binomial; under the International Code it is the valid one for the species.

8. BLASTUS

Blastus Loureiro, Fl. Cochinch. 526. 1790.

The genus *Blastus* is divided by Diels (Bot. Jahrb. **65**: 104–107. 1932) into two sections: *Desmoblastus* and *Thyrsoblastus*.

Section I. *Desmoblastus* Diels

This section is typified by *Blastus cochinchinensis* Lour. as consisting of species with axillary inflorescences, generally sessile or sometimes in pedunculate cymes as in *B. Cogniauxii* Stapf, a species extending from Borneo to Indo-China and Hainan. In addition to these two species, Diels describes two new ones, *B. tenuifolius* and *B. setulosus* from Yao Shan, Kwangsi, of which I have seen no specimens. Three species from Yunnan and one from Kwangsi are herein described as new. They all have axillary sessile inflorescences. Although complete material is not available in all cases, nevertheless, each has certain definite characteristics and they safely appear to represent distinct forms.

The section includes the species numbered 1–8 in this treatment.

Section II. *Thyrsoblastus* Diels

As Diels points out (Bot. Jahrb. **65**: 106–107. 1932), the characters of the species of the section *Thyrsoblastus* are uncertain and further study is needed. A careful examination of all available material, including certain type specimens, shows that the various species proposed in this group are for the most part difficult to distinguish except by certain details in the floral parts, and these parts are mostly inadequately described in various published diagnoses. It is obviously open to question whether or not the characters currently used for this section are strong enough for species segregation. One new species is proposed, distinguished from the others by its general appearance as well as in certain details. It is apparently nearer to *Oxyspora*, a closely related genus, than are the other species.

The section includes the species numbered 9–15 in this treatment.

1. **Blastus cochinchinensis** Lour. Fl. Cochinch. 526. 1790; Seem. Jour. Bot. **1**: 281. 1863; Hance, Jour. Linn. Soc. Bot. **8**: 103. 1867; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 528. 1879; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 301. 1887; Cogn. in DC. Monogr. Phan. **7**: 476. 1891; Guillaum. Bull. Soc. Bot. France **60**: 89, 403. 1913, et in Lecomte, Fl. Gén. Indo-Chine **2**: 896. 1921; H. Lév. Fl. Kouy-Tchéou 276. 1914; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Merr. Lingnan Sci. Jour. **5**: 138. 1927; Trans. Am. Philos. Soc. II. **24**(2): 288. 1935; Diels, Bot. Jahrb. **65**: 105. 1932; Metcalf, Lingnan Sci. Jour. **12**: 155. 1933; Rehd. Jour. Arnold Arb. **15**: 111. 1934.

Anplectrum pauciflorum Benth. Fl. Hongk. 116. 1861.

Blastus parviflorus Triana, Trans. Linn. Soc. **23**: 74. t. 6, f. 65. 1871.

Blastus Marchandii H. Lév. Repert. Sp. Nov. **11**: 494. 1913.

KWANGSI: Tang Han, R. C. Ching 6555 (A, N); Yung District, Steward & Cheo 776 (A, N); Shang-sze District, Shih Wan Tai Shan, W. T. Tsang 22463 (A), 24134 (A, N); Sun-to District, W. T. Tsang 22970 (A). KWANGTUNG: Hongkong, C. Wright s. n. (N); Ting-wu Shan, Sampson (Herb. Hance) 13762 (G), Levine & Groff 93

(A, G), *Levine* 3090 (A), *W. Y. Chun* 6330 (A), 6504 (A), *Y. Tsiang* 739 (A), 1569 (A, N), *S. Y. Lau* 20189 (N), *T. N. Liou* 854 (N); Chung-yuen District, *C. O. Levine* 2091 (A); Sun-yi, *Y. Tsiang* 2759 (N); Loh-chang, *C. L. Tso* 20380 (N); Shih Wan Tai Shan, *H. Y. Liang* 69569 (A), 70037 (A); Ta-pu District, *W. T. Tsang* 21099 (A, N); Hwei-yang District, *W. T. Tsang* 25751 (A); Wung-yuen District, *S. K. Lau* 2582 (A). HAINAN: No precise locality, *C. Ford* s. n. (A, N), *C. Wang* 33230 (N), 34528 (N), 35285 (N), 36376 (A, N); Nodda, *McClure* 8134 (A); Loktung, *S. K. Lau* 27355 (A); Chang-kiang District, *S. K. Lau* 1621 (A, N); Kan-en District, *S. K. Lau* 3863 (A); Ching-mai District, *C. I. Lei* 235 (A, N), 671 (N); Dung Ka, *N. K. Chun & C. L. Tso* 43907 (A, N); Yaichow, *H. Y. Liang* 62067 (A), 62077 (N), 62664 (N); Lam-ko District, *W. T. Tsang* 15782 (A, N); Lai Area, Hung Mo Shan, *Tsang & Fung* 17850 (A, N); Taam-chau District, *W. T. Tsang* 17263 (A). FUKIEN: Fong Kong Tze, *Dunn* (*Hongk. Herb.*) 2708 (A); Eng-lok District, *H. H. Chung* 1374 (A), *L. Chen* 67 (A); Yenping, *H. H. Chung* 2696 (A), 3317 (A); Kushan, near Fuchow, *H. H. Chung* 3702 (A), 6865 (A); Shanghang, *J. L. Gressitt* 1698 (A).

India, Indo-China. Formosa.

2. ***Blastus tenuifolius*** Diels, Bot. Jahrb. **65**: 105. 1932.

Based on *S. S. Sin* 3742 from Yao Shan, Kwangsi; no specimen seen.

3. ***Blastus setulosus*** Diels, Bot. Jahrb. **65**: 106. 1932.

Based on *S. S. Sin & K. K. Whang* 686 from Yao Shan, Kwangsi; no specimen seen.

4. ***Blastus latifolius*** sp. nov.

Frutex circiter 1.3 m. altus, ramulis junioribus plus minusve quadrangularibus, fulvo-pilosis; foliis membranaceis, longe petiolatis, oblongo-ovatis, 7–11 cm. longis, 3.5–5.5 cm. latis, longe acuminatis, basi rotundatis vel subcordatis, 5-nerviis, integris, supra minute squamuloso-glandulosis, disperse setosis, subtus squamuloso-glandulosis, nervis et margine pilosis, venulis secundariis supra subconspicuis, subtus elevatis; petiolo 2–3 cm. longo, villosus; floribus ex axillis foliorum delapsorum, cymis circiter 5-floris, pedunculo 2–3 mm. longo praeditis; calyce turbinato, circiter 3 mm. longo, squamuloso-glanduloso, margine 5-lobato, lobis semi-rotundatis, circiter 1 mm. longis.

YUNNAN: Mengtze, *A. Henry* 9058A (TYPE, A), a shrub 4 ft. high, in forests, alt. 5000 ft., flowers pink.

This species is apparently very close to *Blastus tenuifolius* Diels, from Kwangsi, differing from the latter, according to its description, by the slightly thicker leaves with scattered setose hairs above instead of being glabrous and with shorter peduncles. The flowers of Diels' species are white, according to the collector. No petals are present on the type specimen of this new species, although the field note states "flowers pink."

5. ***Blastus yunnanensis*** sp. nov.

Frutex circiter 2 m. altus, ramulis junioribus subteretibus squamuloso-glandulosis; foliis membranaceis, longe petiolatis, oblongo-lanceolatis, 8–11 cm. longis, 2.5–3 cm. latis, longe acuminatis, basi longe attenuatis, margine integris, supra glabris vel parce setosis, subtus squamuloso-glandulosis, nervis primariis 3, marginalibus 2 gracilioribus additis, venis transversis supra inconspicuis, subtus prominulis; petiolo 1.5–4 cm. longo, squamuloso-glanduloso; floribus ex axillis foliorum delapsorum infra ramis foliatis ortis, cymis 3- vel 4-floris, parvis, pedunculo circiter 1 mm. longo; calyce turbinato, squamuloso-glanduloso, circiter 1.5 mm. longo, margine subintegro; petalis ovatis longe acuminatis, circiter 2.5 mm. longis; filamentis 2 mm.

longis, antheris oblongis, 2 mm. longis, apice subtruncatis, connectivo sub theca elongato, 0.5 mm. longo, leviter incrassato.

YUNNAN: Ping-pien District, *H. T. Tsai* 60813 (TYPE, A), July 14, 1934, a shrub 6 ft. high, in ravine, alt. 1300 m., flowers rose-purple.

This species is near *Blastus setulosus* Diels (from the description), but it differs in the margins of the leaves being non-setulose, in the smaller flower parts, and more distinctly in the structure of the stamens.

6. *Blastus mollissimus* sp. nov.

Frutex, ramulis junioribus dense villosis; foliis tenuiter membranaceis longe petiolatis ovato-oblongis, 10–18 cm. longis, 5–8.5 cm. latis, longe acuminatis, basi rotundatis vel leviter cordatis, 5-nerviis, margine setulosis, supra disperse setosis, subtus pallide squamuloso-glandulosis, praecipue in venis mollissime villosis, nervis transversis supra subconspicuis, subtus prominulis; petiolo 2.5–7 cm. longo, dense villosus; floribus axillaribus, cymis circiter 3-floris; pedunculo circiter 2 mm. longo, villosus; calyce turbinato-campanulato, dense villosus, margine 4-lobato, lobis anguste lanceolatis, 2–3 mm. longis, dense villosis.

KWANGSI: Yao Shan, *C. Wang* 40050 (TYPE, A), Oct. 12, 1936, a small shrub along stream side, fruit green, tomentose.

A species distinctly characterized by the densely villose tomentum on the stems, underside of the leaves, and the calyx. It is probably related to *Blastus setulosus* Diels, but it is distinguished, among other characters, by the much broader leaves.

7. *Blastus hirsutus* sp. nov.

Herba circiter 1 m. alta, ramulis junioribus subquadrangularibus vel 4-sulcatis, glabris; foliis subchartaceis, longe petiolatis, ovato-oblongis, 9–15 cm. longis, 6–9 cm. latis, longe acuminatis, basi late acutis vel rotundatis, 5–7-nerviis, margine setulosis, supra glabris, subtus minute squamuloso-glandulosis, venis transversis supra subconspicuis, subtus distinctis; petiolo 3–7 cm. longo, glabro; floribus haud visis; fructibus ex axillis foliorum delapsorum infra ramis foliatis ortis, cymis 3- vel 4-carpis, pedunculo circiter 1 cm. longo, glabro; calycibus persistentibus turbinato-campanulatis, subhirsutis, 5 mm. longis, margine 4-lobatis, lobis persistentibus, ovatis, 2 mm. longis, tenuibus; capsulis inclusis, apice acute 4-lobatis.

YUNNAN: Shang-pa District, *H. T. Tsai* 54257 (TYPE, A), Sept. 17, 1933, 58672, Oct. 20, 1934, herb to 4 ft. high, in forests, alt. 2500–2800 m., flowers pink, fruit red.

This species, although only fruiting material is available, seems to be remote from other species of the section in its herbaceous habit and its nearly glabrous leaves, which are setulose only along the margins and have very minute scaly glands only on the lower surface. The somewhat softly hirsute calyx, in fruit, has no scaly glands.

8. *Blastus Cogniauxii* Stapf in Hook. Ic. Pl. **24**: t. 2311. 1894; Guillaumin. Bull. Soc. Bot. France **60**: 90, 403. 1913, et in Lecomete, Fl. Gén. Indo-Chine **2**: 1896. 1921. *Ochtocharis parviflora* Cogn. in DC. Monogr. Phan. **7**: 481. 1891, non *Blastus parviflorus* Triana.

HAINAN: Yaichow, *H. Y. Liang* 62607 (N).

Borneo, Indo-China; new to Hainan; also recorded for Kweichow (Guillaumin, l.c.).

Cogniaux based his species on *Beccari* 1403 from Sarawak, Borneo, but

his specific name is preoccupied in *Blastus* by *B. parviflorus* Triana (1871). Stapf mentions the very characteristic discoid glands on the lower surface of the leaves, petioles, young branches, and inflorescences. These glands are characteristic of all species of the genus, but as they are usually very minute and sometimes disappear in age, they are consequently overlooked by most authors.

Spare (Kew Bull. **1929**: 317-319. 1929) is of the opinion that *Blastus Cogniauxii* is strictly limited to Borneo and that the Indo-Chinese plant described by Guillaumin as *B. Cogniauxii* is *B. eglandulosus* Stapf. However, the Hainan plant is clearly glandular and agrees well with both the original description and illustration as well as authentic specimens from Borneo. It may be that both *Blastus Cogniauxii* and *B. eglandulosus* occur in Indo-China.

9. *Blastus Dunnianus* H. Lév. Repert. Sp. Nov. **9**: 449. 1911, Fl. Kouy-Tchéou 276. 1914; Guillaumin. Bull. Soc. Bot. France **60**: 91, 403. 1913; Diels, Bot. Jahrb. **65**: 107. 1932; Merr. & Chun, Sunyatsenia **5**: 144. 1940.

KWEICHOW: Majo, *J. Cavalerie* 2971 (ISOTYPE, A). KWANGSI: Hang-on-yuen, *Z. S. Chung* 81771 (A). KWANGTUNG: Huangtung, *S. S. Sin* 9954 (N); Loh-chang, *C. L. Tso* 21030 (N); Shih Wan Tai Shan, *H. Y. Liang* 69969 (A).

This species is characterized by the obtuse, more or less rounded calyx-lobes. The leaves are membranaceous, with or without a few small teeth, and with very minute glandular scales on the lower surface. The more or less densely arranged flowers are very short-pedicled. The anthers are obtuse at the base. Although Guillaumin describes the calyx-tube as 5 mm. long, I note that in both the isotype and the other collections cited it is only 2-3 mm. long; the fruit is scarcely 5 mm. long.

10. *Blastus Cavaleriei* H. Lév. & Vaniot, Mém. Soc. Sci. Nat. Cherbourg **35**: 395. 1906, Repert. Sp. Nov. **9**: 94. 1907.

Allomorphia Bodinieri H. Lév. Repert. Nov. Sp. **5**: 100. 1908.

Bredia Bodinieri H. Lév. l.c. (1908), pro syn.

Blastus pauciflorus sensu Guillaumin. Bull. Soc. Bot. France **60**: 90. 1913, pro parte; H. Lév. Fl. Kouy-Tchéou 276. 1914; Metcalf, Lingnan Sci. Jour. **12**: 155. 1933, pro parte; Rehd. Jour. Arnold Arb. **15**: 111. 1934; non Benth.

Blastus spathulicalyx Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **59**: 106. 1922, Symb. Sin. **7**: 598. 1933; syn. nov.

KWEICHOW: Tou Chan, *J. Cavalerie* 2676 (HOLOTYPE, photo. and merotype, A), between Kutschou and Liping, *H. Handel-Mazzetti* 10913 (isotype of *B. spathulicalyx* Hand.-Maz., A). KWANGSI: South of Nanning, Shih Wan Tai Shan, *R. C. Ching* 8382 (A, N); north of Luchen, Chu Feng Shan, *R. C. Ching* 5771 (A, N); Ling-wun, *S. K. Lau* 28661 (A); Tzu Yuen, *Z. S. Chung* 83552 (A).

Blastus Cavaleriei H. Lév. & Vaniot was first reduced to *B. pauciflorus* (Benth.) Guillaumin. by Guillaumin, and Léveillé himself followed Guillaumin in his Flore du Kouy-Tchéou. Handel-Mazzetti's *B. spathulicalyx*, described later, evidently represents the same species. This species differs from *B. pauciflorus* (Benth.) Guillaumin. in the long spatulate calyx-lobes, rounded at tip and attaining a length of 3 mm. in fruit. The leaves are denticulate to entire. The calyx-tube is about 4 mm. long. The anthers are obtuse at the base.

11. *Blastus tomentosus* sp. nov.

Frutex circiter 65 cm. altus, ramulis novellis teretibus dense brunneo-strigoso-tomentosis; foliis chartaceis, petiolatis, oblongo-ellipticis vel ovatis, 13–17 cm. longis, 5–10 cm. latis, acuminatis, basi leviter vel perspicue cordatis, margine integris vel obscure denticulatis, supra glabris, subtus squamuloso-glandulosis, nervis 5, supra leviter impressis, subtus elevatis distinctis parce tomentosis vel glabris, venis transversis supra obscuris, subtus elevatis; petiolo 1–2 cm. longo, plus minusve dense strigoso-tomentoso; inflorescentiis terminalibus paniculatis, 12–13 cm. longis, plus minusve tomentosis vel glabrescentibus, pedicellis 1–2 mm. longis; calycibus turbinato-campanulatis 2–3 mm. longis, leviter squamuloso-glandulosis, lobis linearibus vel subspatulatis, 1.5–2 mm. longis, 1 mm. latis, rotundatis; petalis late ovatis, 1.5 mm. longis, acutis, filamentis 3 mm. longis, antheris 4 mm. longis, basi incrassatis, haud attenuatis; stylis 7–8 mm. longis; fructibus capsularibus, circiter 6 mm. longis, quadrangularibus, calycis lobis persistentibus, ad 3 mm. longis.

KWANGSI: Wait-sap District, Tong Shan, near Sap-luk Po Village, *W. T. Tsang* 22792 (TYPE, A), Sept. 15, 1933, a shrub 2 ft. high, fairly common, sandy soil, in swamp, flowers purplish red.

This species is characterized by the abundant strigose hairs on the young branches and petioles. The veins on the under surface of the leaves are also very slightly hairy. In its long, obtuse, more or less spatulate calyxlobes, it is near *Blastus Cavaleriei* H. Lév. & Vaniot, but differs, in addition to the indumentum, in the anthers being thickened at the base but not attenuate, and also in the much smaller floral parts.

In addition to the type specimen, one specimen of *W. T. Tsang* 20827 (N), clearly belongs to this same species. This may be due to a mixture of material, as two other sheets of *Tsang* 20827 represent *Blastus Ernae* Hand.-Maz.

12. *Blastus Ernae* Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **59**: 106. 1922; Merr. Lingnan Sci. Jour. **7**: 317. 1931; Metcalf, op. cit. **12**: 155. 1933.

KWANGTUNG: Mandse Shan, near the Hunan border, *R. Mell* 473 (isotype, A); Tan Hsia Shan, *W. Y. Chun* 5570 (A); Nip Doo to Changkiang, *W. Y. Chun* 5751 (A); Loh-chang District, *W. T. Tsang* 20827 (A, N). Endemic.

This species is distinguished by the stipitate glandular hairs on the calyx-tube, while in the remaining species the calyx-tube is scaly-glandular or subglabrous. It is also characterized by its anthers about 10 mm. long with long attenuate acute bases. The leaves are entire or obscurely crenulate. The calyx-tube is about 5 mm. long with short triangular acute lobes. The style is 14–20 mm. long.

13. *Blastus longiflorus* Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **59**: 106. 1922; Merr. Lingnan Sci. Jour. **7**: 317. 1931; Metcalf, op. cit. **12**: 156. 1933.

KIANGSI: Kien-nan District, *S. K. Lau* 3951 (A). KWANGSI: North of Lin-yen, Tsin Lung Shan, *R. C. Ching* 6945 (A, N); Pai-shou District, *Y. W. Taam* 23 (A); Ling-chuan District, *W. T. Tsang* 27891 (A), 27946 (A); Kwei-lin District, *W. T. Tsang* 28442 (A). KWANGTUNG: Lung Tan Shan, *Mell* 703 (isotype, A); Yingtak, *Y. K. Wang* 2864 (N); Wat Shui Shan, *W. Y. Chun* 7381 (A); Sin-fung District, *Y. W. Taam* 339 (A); Wung-yuen District, *S. K. Lau* 1997 (A).

In the structure of the anther, with its attenuate-acute base, this species

is similar to *Blastus Ernae* Hand.-Maz., but it differs in the calyx-tube, which is lepidote-glandular instead of stipitate-glandular. The calyx-tube is about 4–5 mm. long, with short triangular acute lobes. The anther is about 8 mm. long and the styles 8–10 mm. long. The leaves vary from denticulate to entire.

14. *Blastus apricus* (Hand.-Maz.) comb. nov.

Blastus spathulicalyx Hand.-Maz. var. *apricus* Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **59**: 106. 1922; Metcalf, Lingnan Sci. Jour. **12**: 156. 1933.

KWANGTUNG: Wung-yuen District, S. K. Lau 803 (A, N); Sin-fung District, Y. W. Taam 921 (A); Lienping, R. Mell 638 (photo of ISOTYPE, A). Endemic.

The type of *Blastus spathulicalyx* Hand.-Maz. is from Kweichow. The type of Handel-Mazzetti's variety *apricus*, Mell 638, of which a photograph is available (A), is from Lienping, which is in northern Kwangtung, as are the other two specimens cited above. This differs from *Blastus spathulicalyx* Hand.-Maz. = *Blastus Cavaleriei* H. Lév. & Vaniot in that the calyx-lobes are not spatulate and rounded but are linear and acute and are only up to 2 mm. long. The leaves are slightly denticulate. It is probably close to *Blastus pauciflorus* (Benth.) Guillaum., but it has longer (about 4–5 mm.) calyx-tubes, while the anther-bases are attenuate.

15. *Blastus pauciflorus* (Benth.) Guillaum. Bull. Soc. Bot. France **60**: 90, 403. 1913; Merr. Philip. Jour. Sci. Bot. **13**: 151. 1918; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Diels, Bot. Jahrb. **65**: 107. 1932, pro parte; Metcalf, Lingnan Sci. Jour. **12**: 155. 1933.

Allomorpha pauciflora Benth. in Hook. Lond. Jour. Bot. **1**: 485. 1842; Triana, Trans. Linn. Soc. **28**: 74. 1871; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 301. 1887.

Oxyspora ? *pauciflora* Benth. Fl. Hongk. 116. 1861.

Blastus Hindsii Hance, Jour. Linn. Soc. Bot. **13**: 103. 1873.

KIANGSI: Southern Kiangsi, Tai Au Hong, J. L. Gressitt 1576 (A). KWANGTUNG: North River, H. F. Hance 11352 (G); Canton, C. O. Levine 1462 (G); Lofaushan, E. D. Merrill 10743 (N); Taai Yeung Shan, F. A. McClure 6642 (A, N); Ta-pu District, W. T. Tsang 21567 (A, N); Hweiyang, W. T. Tsang 25557 (A).

This species is characterized by its small flowers, with the calyx-tube about 2–3 mm. long. The calyx-lobes are small and triangular, and thus, in this respect, the species can be distinguished from the closely related ones like *Blastus Dunnianus* H. Lév. and *Blastus Cavaleriei* H. Lév. & Vaniot. The leaves are in general entire. The anthers are obtuse at their bases. This species seems to be confined to the eastern part of Kwangtung and adjacent southern Kiangsi, for the Kweichow and Kwangsi plants referred to this species by Guillaumin, Diels, Metcalf, etc., actually belong to *Blastus spathulicalyx* Hand.-Maz. = *B. Cavaleriei* H. Lév. & Vaniot.

9. BREDIA

Bredia Blume, Mus. Bot. Lugd.-Bat. **1**: 25. 1849; Diels, Bot. Jahrb. **65**: 108. 1932, ampl.

Tashiroea Matsum. ex Ito & Matsum. Jour. Coll. Sci. Univ. Tokyo **12**: 489. 1899, syn. nov.

The genus *Bredia* was established by Blume in 1849 for *Bredia hirsuta* Blume, a species of Formosa, the Liukiu Islands, and Japan. In 1871 Hooker f. described *B. Oldhami* from Formosa, a species rather distinctly

different from Blume's original generic type. This is accepted by Cogniaux and other authors as belonging in *Bredia*. Diels in 1924 described *B. amoena*, the first species of the genus known from China. He considerably amplified the concept of the genus in 1932 by describing several new species and transferring a number of entities originally described as representatives of other genera to *Bredia*. His concept is tentatively accepted here. In this broader sense, the genus includes species with eight stamens either subequal or distinctly unequal. The anthers are attenuate at their apices, and the connectives are either slightly elongated at the base of the anthers or not, usually gibbose in front and short-calcarate behind. The flowers are either solitary, umbellate, or cymose-paniculate. The fruit is usually flattened or slightly rounded at the top.

The genus *Tashiroea* Matsumura, described in 1899, was based on two species, *T. okinawensis* Matsum. and *T. yaeyamensis* Matsum., both from the Liukiu Islands. Diels added a Chinese species, *T. chinensis*, to the genus in 1924. It is found that all of these species are closely related to *Bredia Oldhami* Hook. f. and are, I believe, congeneric with it. *Tashiroea chinensis* Diels is also found to be identical with *Bredia glabra* Merr. Accepting the current concept as to the wider scope of the genus *Bredia*, *Tashiroea* is here included within its limits.

The type species, *Bredia hirsuta* Blume, and a closely related one, *B. scandens* Hayata, are both known from Formosa. Closely allied to them is *B. amoena* Diels from southeastern coastal China. These three species form a group with cymose-paniculate and hirsute inflorescences and with cordate, pubescent or glabrous leaves. However, the last one is also near the next group and appears to be transitional between the two groups. This group extends from Japan, the Liukiu Islands, and Formosa to the coastal regions of China.

A second group is represented by the three species of *Tashiroea*, as well as by *Bredia Oldhami* Hook. f. and *B. quadrangularis* Cogn. These species are characterized by attenuate, rarely rounded or subcordate leaves, which are glabrous or minutely stellate-pubescent. The inflorescences are cymose-paniculate as in the first group, rarely solitary, and usually glabrous. To this group one new species from China is added. These representatives occur in Formosa and the maritime districts of southern China.

A third group is found in western and southern China. These species have cordate, hirsute, or velutinous leaves and umbellate, rarely 1-flowered inflorescences. To this group are added three new species from China.

These three groups, although more or less different, nevertheless exhibit common characters and intergrading forms, and it is thought best for the time being to treat them as sections of the genus *Bredia*. Their differentiating characters are as follows.

I. Sectio **Eubredia** sect. nov.

Folia rotundata vel cordata, pubescentia vel glabrata. Inflorescentia cymoso-paniculata, plus minusve hirsuta; staminibus 8, inaequalibus, connectivo sub theca elongato vel haud elongato.

1. *Bredia hirsuta* Blume (Formosa, Liukiu, Japan?).
2. *Bredia scandens* Hayata (Formosa).
3. *Bredia amoena* Diels (China: Chekiang, Fukien, Kwangtung).

II. Sectio **Tashiroea** (Matsum.) sect. nov.

Folia attenuata, rarius rotundata vel subcordata, glabra vel minute stellato-pubescentia. Inflorescentia cymoso-paniculata, rarius solitaria, glabra; staminibus 8, inaequalibus, connectivo sub theca interdum elongato.

1. *Bredia Oldhami* Hook. f. (Formosa).
2. *Bredia quadrangularis* Cogn. (China: Fukien, Kiangsi).
3. ***Bredia okinawensis*** (Matsum.) comb. nov.
Tashiroea okinawensis Matsum. ex Ito & Matsum. Jour. Coll. Sci. Univ. Tokyo **12**: 490. 1899, Ic. Pl. Koisikav. **1**: 153. t. 77. 1913.
 Liukiu Islands.
4. ***Bredia yaeyamensis*** (Matsum.) comb. nov.
Tashiroea yaeyamensis Matsum. ex Ito & Matsum. Jour. Coll. Sci. Univ. Tokyo **12**: 489. 1899, Ic. Pl. Koisikav. **1**: 150. t. 76. 1913.
 Liukiu Islands.
5. *Bredia sinensis* (Diels) Li (China: Chekiang, Fukien, Kwangtung, Kwangsi).
6. *Bredia sessilifolia* Li (China: Kwangsi).

III. Sectio **Sinobredia** sect. nov.

Folia cordata, hirsuta vel velutina. Inflorescentia umbellata rarius uniflora; staminibus 8, subaequalibus vel inaequalibus, connectivo plerumque sub theca haud elongato.

1. *Bredia velutina* Diels (China: Yunnan).
2. *Bredia sepalosa* Diels (China: Kwangsi).
3. *Bredia microphylla* Li (China: Kwangsi).
4. *Bredia Fordii* (Hance) Diels (China: Szechuan, Kweichow, Kwangtung).
5. *Bredia Cavaleriei* (H. Lév.) Diels (China: Yunnan, Kweichow, Kwangtung).
6. *Bredia tuberculata* (Guillaum.) Diels (China: Kwangtung, Kwangsi, Kiangsi).
7. *Bredia longiloba* (Hand.-Maz.) Diels (China: Hunan, Kiangsi, Kwangtung).
8. *Bredia yunnanensis* (H. Lév.) Diels (China: Yunnan).
9. *Bredia omeiensis* Li (China: Szechuan).
10. *Bredia cordata* Li (China: Sikang, Szechuan).

The Chinese species are enumerated below.

1. ***Bredia amoena*** Diels, Notizbl. Bot. Gart. Berlin **9**: 197. 1924, Bot. Jahrb. **65**: 111. 1932; Metcalf, Jour. Arnold Arb. **12**: 271. 1931, Lingnan Sci. Jour. **12**: 154. 1933.
Bredia chinensis Merr. Jour. Arnold Arb. **8**: 11. 1927.
Bredia Pricei Metcalf, Lingnan Sci. Jour. **12**: 153. 1933, syn. nov.
- CHEKIANG: Sia Chu, *R. C. Ching* 1684 (A); North Yentang, *H. H. Hu* 30 (HOLOTYPE, photo. in A); Ts'ing Tien, *Y. L. Keng* 151 (A), 157 (A); Yentang Shan, *C. Y. Chiao* 14691 (A). FUKIEN: Shou-ning, *R. C. Ching* 2309 (A, N).

Bredia Pricei Metcalf was based on *W. R. Price* 1200A, this same number being cited by Diels in 1932 as representing *B. amoena*.

- 1a. ***Bredia amoena*** Diels var. ***serrata*** var. nov.

A typo speciei differt foliis distincte arcuato-serratis, dentibus acutis, apice rigidis.

CHEKIANG: Ts'ing Tien, *Y. L. Keng* 187 (TYPE, A), July 28, 1926, a low shrub, growing by roadside, flowers purplish.

2. ***Bredia quadrangularis*** Cogn. in DC. Monogr. Phan. **7**: 473. 1891; Guillaum. Bull. Soc. Bot. France **60**: 403. 1913; Metcalf, Lingnan Sci. Jour. **12**: 155. 1933.

KIANGSI: Yuan-shan District, *H. H. Hu* 1313 (A). FUKIEN: No precise locality, *Dunn* (*Hongk. Herb.*) 2710 (A); Yenping, Pao-chu Shan, *H. H. Chung* 2931 (A).

The type of Cogniaux, "in China australi, Seemann in herb. Hort. Petrop.," according to Diels (*Bot. Jahrb.* **65**: 111. 1932), cannot be found in the Leningrad herbarium. Guillaumin (l. c.) records that species from Kwangtung and Metcalf (l. c.) refers *Hu* 1313 from Kiangsi to this species. The Chung specimen from Fukien cited above also agrees well with Cogniaux's description and is even more typical. This species is close to *Bredia sinensis* (Diels) Li, but is characterized by its terminal and axillary inflorescences and slender filiform peduncles, 3–4 cm. long.

3. *Bredia sinensis* (Diels) comb. nov.

Tashiroea sinensis Diels, *Notizbl. Bot. Gart. Berlin* **9**: 198. 1924.

Bredia glabra Merr. *Jour. Arnold Arb.* **8**: 12. 1927; Metcalf, *Lingnan Sci. Jour.* **12**: 155. 1933; syn. nov.

KWANGSI: Yao Shan, *C. Wang* 40258 (A). KWANGTUNG: Mei District, Yam Na Shan, *J. L. Gressitt* 1371 (A), *W. T. Tsang* 21403 (A). FUKIEN: No precise locality, *Dunn* (*Hongk. Herb.*) 2709 (A); Shaowu and vicinity, Fan Hsueh Niao, *Fukien Christ. Univ.* 9152 (A); Chung-an District, *H. H. Hu* 1343 (ISOTYPE, A). KANGSI: Southern Kiangsi, Hong San, *J. L. Gressitt* 1520 (A). CHEKIANG: Pang Young, *R. C. Ching* 2029 (isotype of *Bredia glabra* Merr., A); Ts'ing Tien, *Y. L. Keng* 152 (A), 156 (A); Tai Shun, *Y. L. Keng* 263 (A).

Diels (l. c.) referred this species to *Tashiroea* with some doubt. An examination of the type shows that it is identical with that of *Bredia glabra* Merr. After studying Liukiu material representing *Tashiroea* Matsum., I consider that this genus should be reduced to *Bredia* Blume. The stamen characters, as originally described by Matsumura, but not clearly depicted in the two later drawings, are essentially the same as those of *Bredia*. Both of Matsumura's Liukiu species are rather closely related to *Bredia sinensis* (Diels) Li of the southeastern coastal provinces of China and *Bredia Oldhami* Hook. f. of Formosa in habit, vegetative characters, inflorescences, and especially in minute stellate indumentum on the leaves.

4. *Bredia sessilifolia* sp. nov.

Frutex circiter 30 cm. altus; foliis coriaceis sessilibus vel subsessilibus oblongo-ovatis, 6–10 cm. longis, 2–3 cm. latis, longe acuminatis, basi rotundatis vel subcordatis, distincte 3-nerviis, nervis marginalibus 2 gracilioribus additis, supra inconspicuis, subtus elevatis, margine integris revolutis rarius parce denticulatis, venulis utrinque inconspicuis; floribus ignotis; infructescentiis terminalibus cymoso-paniculatis, ad 6 cm. longis, pedicellis circiter 1 cm. longis; capsulis in calycibus inclusis, circiter 4.5 mm. longis, apice leviter rotundatis.

KWANGSI: Shang-sze District, Shih Wan Tai Shan, Tang Lung Village, *W. T. Tsang* 24346 (TYPE, A), Sept. 25, 1934, 24381 (A, N), Sept. 30, 1934, 1 ft. high, fairly common in thickets, fruits gray or purplish red.

A species apparently related to *Bredia sinensis* (Diels) Li, but readily distinguished by its sessile or subsessile leaves.

5. *Bredia velutina* Diels, *Bot. Jahrb.* **65**: 109. 1932.

YUNNAN: Mengtze, *A. Henry* 13479 (ISOTYPE, A, N). Known from the original collection only.

6. *Bredia sepalosa* Diels, Bot. Jahrb. **65**: 109. 1932.

Described from Kwangsi, based on S. S. Sin & K. K. Whang 648; no specimen seen.

7. *Bredia microphylla* sp. nov.

Suffruticosa scandens 8–10 cm. alta ramosa, ramis rufo-brunneis pubescentibus gracilibus, nodis radicanibus; foliis inaequalibus vel aequalibus petiolatis subchartaceis ovato-orbicularibus, 1–2 cm. longis, 1–1.8 cm. latis, subacutis vel rotundatis, basi rotundatis vel cordatis 5-nerviis, margine integris, supra hirsutis, parce hispido-pilosis, subtus pubescentibus, nervis venulisque supra inconspicuis, subtus elevatis; petiolo 0.5–1.5 cm. longo, pubescente; floribus terminalibus solitariis rarius 3-umbellatis; pedicellis 1.3–1.5 cm. longis, pubescentibus; calycibus turbinatis, circiter 3 mm. longis glanduloso-setosis, lobis linearibus 2–3 mm. longis; petalis 4, roseis ovatis acutis circiter 11×6 mm.; staminibus 8, inaequalibus: 4 majoribus filamentis 3 mm. longis, antheris linearibus acutis, 3 mm. longis, connectivo basi sub theca leviter elongato antice tuberculato; 4 minoribus filamentis 2 mm. longis, antheris 2.5 mm. longis, connectivo basi tuberculato, postice haud calcarato; stylis 7 mm. longis, stigmatibus inconspicuis; capsulis 4-lobatis circiter 4.5 mm. longis, apice leviter rotundatis, in calycibus inclusis.

KWANGSI: Kwei-lin District, Chi-fen Shan, Hsi-chang Village and vicinity, W. T. Tsang 28432 (TYPE, A), 28477 (A), Oct. 1–11, 1937, a climber, fairly common, 3–4 in. high, flowers purplish red, fruits white.

This distinct species is recognized by its slender scandent branches and small, more or less rounded leaves. In the large calyx-lobes, it is evidently related to *Bredia sepalosa* Diels.

8. *Bredia Fordii* (Hance) Diels, Bot. Jahrb. **65**: 110. 1932.

Otanthera Fordii Hance, Jour. Bot. **29**: 46. 1881; Cogn. in DC. Monogr. Phan. **7**: 342. 1891; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 299. 1887; Guillaum. Bull. Soc. Bot. France **60**: 402. 1913.

KWANGSI: Tuhshan, Y. Tsang 6908 (A), 6563 (N). KWANGTUNG: Hongkong, C. Ford s. n. (G). Also known from Szechuan.

9. *Bredia Cavaleriei* (H. Lév.) Diels, Bot. Jahrb. **65**: 110. 1932; Hand.-Maz. Symb. Sin. **7**: 599. 1933; Rehd. Jour. Arnold Arb. **15**: 112. 1934.

Barthea Cavaleriei H. Lév. Repert. Sp. Nov. **8**: 61. 1910.

Fordiophyton Cavaleriei Guillaum. Bull. Soc. Bot. France **60**: 275, 404. 1913; H. Lév. Fl. Kouy-Tchéou 276. 1914.

Fordiophyton Cavaleriei var. *violacea* H. Lév. Cat. Pl. Yun-Nan 176. 1916, nom. nud.

KWANGTUNG: Yao Shan, S. S. Sin 9911 (N). The original specimens from Kweichow not seen.

10. *Bredia tuberculata* (Guillaum.) Diels, Bot. Jahrb. **65**: 110. 1932.

Fordiophyton tuberculatum Guillaum. in Lecomte, Not. Syst. **2**: 326. 1931, Bull. Soc. Bot. France **60**: 404. 1913.

KWANGSI: South of Nanning, Shih Wan Tai Shan, R. C. Ching 8196 (N), 8309 (A, N); Yao Shan, C. Wang 39973 (A), 40201 (A); Chen-pien District, S. P. Ko 55878 (A); Shang-sze District, Shih Wan Tai Shan, W. T. Tsang 22457 (A), 22563 (A); Wait-sap District, Tong Shan, W. T. Tsang 22761 (A); Kwei-lin District, W. T. Tsang 28114 (A). KWANGTUNG: Lofaushan, C. Ford 314 (N); Loh-chang, C. L. Tso 20999 (N); Sin-fang District, Y. W. Taam 287 (A); Mai District, W. T. Tsang 21515 (A, N). KIANGSI: Southern Kiangsi, Hong San, J. L. Gressitt 1639 (A).

11. *Bredia longiloba* (Hand.-Maz.) Diels, Bot. Jahrb. **65**: 111. 1932; Hand.-Maz. Symb. Sin. **7**: 599. 1933.

Fordiophyton gracile Hand.-Maz. var. *longilobum* Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **63**: 3. 1926.

HUNAN: Chang-ning District, *C. S. Fan & Y. Y. Li 314 (A)*. KWANGTUNG: Yang-shan District, *T. M. Tsui 746 (A)*. Also known from Kiangsi.

12. *Bredia yunnanensis* (H. Lév.) Diels, Bot. Jahrb. **65**: 111. 1932; Rehd. Jour. Arnold Arb. **15**: 112. 1934.

Bredia yunnanensis H. Lév. Repert. Sp. Nov. **11**: 300. 1912.

Blastus Mairei H. Lév. l.c.

Fordiophyton Cavaleriei (H. Lév.) Guillaum. Bull. Soc. Bot. France **60**: 275. 1913, pro parte.

YUNNAN: No specimen seen.

13. *Bredia omeiensis* sp. nov.

Herba suffruticosa erecta 15–30 cm. alta, ramis petiolisque rufo-brunneis pubescentibus patule hispido-pilosis; foliis subchartaceis oppositis aequalibus plerumque longe petiolatis ovatis, 3–6 cm. longis, 2–3.5 cm. latis, longe acuminatis, basi cordatis, 5-nerviis, margine serrulatis et dense setulosis, in sicco supra atro-olivaceis, subtus pallidioribus, utrinque plus minusve dense setulosis, venis transversis utrinque subconspicuis; petiolo 1–3.5 cm. longo; inflorescentiis terminalibus umbellatis, pedunculis pedicellis calycibus et bracteis rufo-brunneis pubescentibus parce setulosis, pedunculis 1–2 cm. longis, pedicellis 0.5–1 cm. longis, bracteis lanceolatis, circiter 5 mm. longis et 1 mm. latis, acuminatis, caducis; calycibus turbinatis, circiter 4 mm. longis, lobis linearibus, 2–2.5 mm. longis, 1 mm. latis; petalis 4 roseis, orbiculari-ovatis, 1–1.3 cm. longis, 0.6–0.8 cm. latis, apice acutis; staminibus 8, inaequalibus: 4 majoribus filamentis 1 cm. longis, antheris 5 mm. longis, leviter curvatis, connectivo basi leviter incrassato, haud appendiculato; 4 minoribus filamentis 5 mm. longis, antheris 3.5 mm. longis, erectis, connectivo basi antice tuberculato, postice breviter calcarato; stylis circiter 1.7 cm. longis, stigmatibus inconspicuis.

SZECHUAN: Mt. Omei, *Y. S. Liu 1080 (TYPE, A)*, Aug. 21, 1937, alt. 1100 m., *T. C. Peng 44 (A)*, July 23, 1938, herb. 0.2 m. high, hillside, alt. 900 m., flowers purplish red, *W. P. Fang 12614 (A)*, July 28, 1938, herb on grassy slopes, rare, alt. 1100 m., in fruit.

In its general habit as well as the shape of its leaves, this species is close to *Bredia tuberculata* (Guillaum.) Diels, differing in its smaller leaves and flowers, while the leaves are more or less densely setulose on both surfaces. It is further characterized by its very unequal stamens, the four larger ones having the connectives inappendiculate and but slightly enlarged at the base, while the four smaller ones have the connectives 2-tuberculate in the front and short-calcarate behind at the base.

14. *Bredia cordata* sp. nov.

Herba suffruticosa ramosa circiter 20 cm. alta, ramulis gracilibus parce setosis vel pubescentibus; foliis inaequalibus vel aequalibus petiolatis subchartaceis ovato-oblongis, 3–6 cm. longis, 1.7–3.5 cm. latis, acuminatis, basi cordatis, 5-nerviis, margine setoso-denticulatis, supra hirsutis, subtus leviter pubescentibus, venulis transversis, utrinque subconspicuis; petiolo 1.5–3.5 cm. longo, pubescente vel setoso; inflorescentiis terminalibus umbellatis, 2- vel 3-floris, pedunculis circiter 2 cm. longis, pedicellis circiter 1.5 cm. longis, bracteis oblongis, acuminatis, 5–7 mm. longis, 2–4 mm. latis, hirsutis, pedunculis pedicellis calycibusque pubescentibus vel glanduloso-setosis; calycibus turbinatis, circiter 1.5 mm. longis; petalis 4, roseis ovatis acutis, circiter 1.1 cm. longis et 5 mm. latis; staminibus 8: 4 majori-

bus filamentis 9 mm. longis, antheris linearibus acutis 8 mm. longis, plus minusve curvatis, connectivo basi antice minute 2-tuberculato, postice haud calcarato; 4 minoribus filamentis 5 mm. longis, antheris linearibus acutis 5 mm. longis, plus minusve erectis, connectivo basi antice 2-tuberculato, postice distincte calcarato; stylis circiter 1.3 cm. longis, stigmatе inconspicuo; capsulis 4-lobatis, circiter 5.5 mm. longis, apice depressis, in calycibus inclusis.

SIKANG: Ya-an, C. Y. Chiao 1205 (TYPE, A), July 30, 1939, a low herb growing among dense forest shade, alt. 686 m., flowers pinkish. SZECHUAN: Sung-pan District, W. P. Fang 6024 (A), 8 in. high, in thickets.

This species is manifestly close to the Formosan *Bredia hirsuta* Blume, differing in its smaller size and smaller leaves, with its inflorescences of simple umbels of 2 or 3 flowers. In *Bredia hirsuta* the flowers are born in lax paniced cymes 10–15 cm. long.

10. SARCOPYRAMIS

Sarcopyramis Wallich, Tent. Fl. Nepal. 32. t. 23. 1824.

The genus *Sarcopyramis* is quite distinct and well-characterized by its anther structure and foliaceous bracts. The type species, *S. nepalensis* Wall., is widely distributed in southern Asia and appears to be very variable in size. *Sarcopyramis delicata* C. B. Robinson was originally described from the Philippines, but it is also found in Formosa and China. Related to this species are two new ones herein described from China. Thus the total number of species of this genus is now four, and these may be differentiated by the following key.

KEY TO THE SPECIES

- A. Flowers in small clusters; leaves about 5–10 cm. long.1. *S. nepalensis*.
 - AA. Flowers solitary; leaves scarcely over 1.5 cm. long.
 - B. Leaves more or less setose above, the margins subentire or entire.
 - C. Leaves about 2.5 cm. long and 1.5 cm. broad; calyx-teeth lanceolate, 1.5 mm. long; petals shallowly 3-lobed at the tip.2. *S. delicata*.
 - CC. Leaves to 1.1 cm. long and 1 cm. broad; calyx-teeth minute; petals acute.3. *S. parviflora*.
 - BB. Leaves glabrous, non-setose, the margins distinctly crenate.4. *S. crenata*.
1. *Sarcopyramis nepalensis* Wall. Tent. Fl. Nepal. 32. t. 23. 1826; Benn. Pl. Jav. Rar. 214. 1844; Cogn. in DC. Monogr. Phan. 7: 517. 1891; C. B. Clarke in Hook. f. Fl. Brit. Ind. 2: 541. 1879; Forbes & Hemsl. Jour. Linn. Soc. Bot. 23: 302. 1887; Guillaum. Bull. Soc. Bot. France 60: 343, 404. 1913; Diels, Bot. Jahrb. 65: 111. 1932; Hand.-Maz. Symb. Sin. 7: 600. 1933; Rehd. Jour. Arnold Arb. 18: 227. 1937.
- Sarcopyramis lanceolata* Wall. List no. 6290. 1832, nom. nud.; Benn. l.c.; Kurz, Jour. Bot. 11: 193. 1873, Jour. As. Soc. 46(2): 77. 1877; Hance, Jour. Bot. 16: 107. 1878.
- Sarcopyramis grandiflora* Griff. Notul. 4: 678, Ic. Pl. Asiat. t. 639. 1854.
- Sarcopyramis Bodinieri* H. Lév. & Vaniot, Mém. Soc. Sci. Nat. Cherbourg 35: 397. 1906, Repert. Nov. Sp. 4: 95. 1907.
- Phyllagathis chinensis* Dunn, Jour. Linn. Soc. Bot. 38: 360. 1908; Guillaum. Bull. Soc. Bot. France 60: 404. 1913.
- Sarcopyramis nepalensis* var. *Bodinieri* H. Lév. Fl. Kouy-Tchéou 278. 1914.
- Sarcopyramis Dielsii* Hu, Bull. Fan. Mem. Inst. Biol. Bot. 7: 26. 1936, syn. nov.

SZECHUAN: Kuan District, *W. P. Fang* 2149 (G). SIKANG: Kanting, *C. Y. Chiao* 2094 (A). YUNNAN: Mengtze, *A. Henry* 9725 (N), 10298 (A), 10990 (N); Szemao, *A. Henry* 13562B (N), 13562C (N); Champotong, *C. W. Wang* 67119 (A), 67214 (A), 67346 (A); Shang-pa, *H. T. Tsai* 54735 (A), 58729 (isotype of *Sarcopyramis Dielsii*, A), 59161 (A); Salween-Kiukiang Divide, Newahlung, *T. T. Yü* 19241 (A), Kiukiang Valley (Taron), *T. T. Yü* 19511 (A); Taron-Taru Divide, Valley of Bucahwang, *T. T. Yü* 20143 (A). KWEICHOW: Ta Ho Yen, Fan Ching Shan, *Steward, Chiao & Cheo* 636 (N); Tuhshan, *Y. Tsiang* 6536 (N). KWANGSI: North of Luchen, *R. C. Ching* 6221 (N); Ling-yuin District, *Steward & Cheo* 353 (G, N); Yao Shan, Pin Nan, *C. Wang* 39152 (A); Ling-chuan District, *W. T. Tsang* 27859 (A). KWANGTUNG: Mei District, Yam Na Shan, *W. T. Tsang* 21444 (G, N). KIANGSI: Lushan, *H. H. Chung & S. C. Sun* 498 (N), *C. Y. Chiao* 18626 (N). FUKIEN: No precise locality, *Dunn (Hongk. Herb.)* 2711 (G).

A species of wide distribution in southern Asia from Malay Peninsula to northeastern India, Burma, and southern China. It is quite variable in size.

2. *Sarcopyramis delicata* C. B. Robinson, Bull. Torr. Bot. Club **35**: 72, 75. 1908; Merr. & Chun, Sunyatsenia **5**: 144. 1940.

SIKANG: Ya-an, Moon-ting Shan, *C. Y. Chiao* 1034 (A). YUNNAN: Mengtze, *A. Henry* 9030 (N). KWANGSI: Yao Shan, *C. Wang* 39505 (A), 40307 (A). KWANGTUNG: Sun-yi, *S. P. Ko* 51277 (N). HAINAN: Po-ting, *F. C. How* 73687 (G).

A species found in the Philippines, Formosa, and Hainan. New to continental China.

3. *Sarcopyramis parvifolia* Merrill in herb. sp. nov.

Herba parva, circiter 5 cm. alta, erecta vel subprostrata, caulibus simplicibus teretibus glabris; foliis parvis, submembranaceis, ovatis vel orbicularibus, ad 1.1 cm. longis et 1 cm. latis, obtusis, basi rotundatis, margine serratis vel subintegris, indistincte 3-nerviis, supra parce setosis, subtus glabris, utrinque viridibus vel subtus subrufis; petiolo circiter 5 mm. longo, tenui, glabro; floribus terminalibus solitariis, pedicellis ad 1.5 mm. longis glabris, bracteis plurimis foliaceis membranaceis obovatis, ad 4 mm. longis latisque, apice rotundatis ciliatis; calycis tubo anguste infundibuliformi, circiter 3 mm. longo et 2.5 mm. lato, extus glabro, margine minute 4-dentato; petalis roseis obovatis, circiter 6 mm. longis et 3 mm. latis, apice mucronato-acutis; staminibus 8, aequalibus, filamentis 2 mm. longis, antheris elliptico-obovatis, 1 mm. longis, connectivo postice brevissime prolongato; stylis 2.5 mm. longis, stigmatibus indistincto.

KWANGSI: Shang-sze District, Shih Wan Tai Shan, near Iu Shan Village, *W. T. Tsang* 22407 (TYPE, A), June 2-7, 1933, 2 in. high, fairly common in thickets on steep slopes, flowers light red.

This species is near *Sarcopyramis delicata* C. B. Robinson, but it is a smaller plant with smaller leaves and flowers. It differs technically in the very small calyx-teeth and the acute petals.

4. *Sarcopyramis crenata* sp. nov.

Herba delicata, ad 7 cm. alta, erecta vel subprostrata, caulibus simplicibus alatis; foliis parvis membranaceis utrinque glabris, haud setosis, orbicularibus, ad 1 cm. diametro, apice rotundatis, basi subcordatis, margine crenatis, petiolo 3-5 mm. longo, tenui, glabro; floribus ignotis; fructibus terminalibus vel axillaribus solitariis, pedicellis 0.5-1 cm. longis glabris, immaturis circiter 2.5 mm. longis et 5 mm. latis, calycis lobis foliaceis,

membranaceis, ovatis, ad 4 mm. longis, glabris, apice rotundatis, margine crenatis.

YUNNAN: Chen-kang District, *C. W. Wang* 72396 (TYPE, A), herb in ravines, alt. 1950 m.

This species is related to *Sarcopyramis delicata* C. B. Robinson, but it can be distinguished by its more delicate habit, its rounded crenate leaves glabrous throughout, and by the large, broad, crenate calyx-lobes.

11. FORDIOPHYTON

Fordiophyton Stapf, Ann. Bot. **6**: 314. 1892.

Diels (Bot. Jahrb. **65**: 114. 1932) recognizes four species in *Fordiophyton*, one from Indo-China and three from southern China. *Fordiophyton gracile* Hand.-Maz., transferred by Diels to *Bredia*, appears to be a good species of the genus wherein it was described by Handel-Mazzetti. One new species is herein added, making the total number of Chinese species six.

1. **Fordiophyton Faberi** Stapf, Ann. Bot. **6**: 314. 1892; Guillaum. Bull. Soc. Bot. France **60**: 274, 404. 1913; H. Lév. Fl. Kouy-Tchéou 276. 1914; Diels, Bot. Jahrb. **65**: 114. 1932; Rehd. Jour. Arnold Arb. **15**: 112. 1934.

Bredia Cavaleriei H. Lév. & Vaniot, Mém. Soc. Sci. Nat. Cherbourg **35**: 396. 1906, Repert. Nov. Sp. **4**: 94. 1907.

Oxyspora Cavaleriei H. Lév. l.c. (1906 et 1907), pro syn. *Brediae Cavaleriei*.

Bredia Mairei H. Lév. Repert. Sp. Nov. **11**: 300. 1912.

Blastus Lyi H. Lév. Repert. Sp. Nov. **11**: 301. 1912.

SIKANG: Ya-an, Moon-ting Shan, *C. Y. Chiao* 1303 (N). SZECHUAN: Mt. Omei, *W. P. Fang* 2391 (G), 2428 (G), 3025 (G, N), 3026 (G, N), *C. Y. Chiao & C. S. Fan* 145 (A), *K. N. Yin* 62 (A). Also reported from Yunnan and Kweichow.

2. **Fordiophyton Fordii** (Oliv.) Krasser in Engl. & Prantl, Nat. Pflanzenfam. **3**(7): 175. 1893; Guillaum. Bull. Soc. Bot. France **60**: 404. 1913; Diels, Bot. Jahrb. **65**: 113. 1932; Hand.-Maz. Symb. Sin. **7**: 600. 1933.

Sonerila Fordii Oliv. in Hook. Ic. Pl. **15**: t. 1457. 1884; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 301. 1887; Cogn. in DC. Monogr. Phan. **7**: 516. 1891.

Fordiophyton cantonense Stapf, Ann. Bot. **6**: 314. 1892.

CHEKIANG: Lung-chang, *K. Ling* 2997 (N); King-yuan, *R. C. Ching* 2323 (G). KIANGSI: Hong San, *J. L. Gressitt* 1656 (G). KWEICHOW: Tuhshan, *Y. Tsiang* 6554 (N). KWANGTUNG: Canton, *C. O. Levine* 1560 (G); Wung-yuen-District, *S. K. Lau* 2423 (G); Loh-chang District, *W. T. Tsang* 20764 (A, N); Lofaushan, *E. D. Merrill* 1032 (N); no precise locality, *C. Ford* s. n. (N); Hwei-yang District, *W. T. Tsang* 25452 (A), 25575 (A); Shaochow, Lungtou-shan, *R. Mell* 706 (A). FUKIEN: Yenping, *H. H. Chung* 2962 (G), 3032 (G).

- 2a. **Fordiophyton Fordii** (Oliv.) Krasser var. **vernicium** Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **59**: 1907. 1922; Merr. Lingnan Sci. Jour. **7**: 317. 1931.

KWANGTUNG: Lienping, *R. Mell* 636 (ISOTYPE, A).

3. **Fordiophyton gracile** Hand.-Maz. Anz. Akad. Wiss. Wien Math.-Nat. **63**: 10. 1926. *Bredia gracilis* Diels, Bot. Jahrb. **65**: 110. 1932; Hand.-Maz. Symb. Sin. **7**: 598. 1933.

HUNAN: Heng Shan, *Handel-Mazzetti* 12380 (ISOTYPE, A); Sin-ning District, *C. S. Fan & Y. Y. Li* 600 (G).

This is a species of *Fordiophyton* and I see no reason for transferring it to *Bredia* as Diels did. *Fordiophyton gracile* var. *longilobum* Hand.-Maz. is a different plant, of which I have seen no specimen. Diels is apparently

right in treating the variety as a species of *Bredia*, *B. longiloba* (Hand.-Maz.) Diels. A Hunan specimen, *C. S. Fan & Y. Y. Li 314*, is referable to the latter species.

4. **Fordiophyton polystegium** Hand.-Maz. *Sinensia* **3**: 196. 1933.

KWANGSI: San-chiang District, *A. N. Steward & C. C. Cheo 1017* (G, N); Tzu-yuen District, *Z. S. Chung 83454* (N).

5. **Fordiophyton strictum** Diels, *Bot. Jahrb.* **65**: 113. 1932.

YUNNAN: Mengtze, *A. Henry 9037* (ISOTYPE, A, N), *9037A* (A); Ping-pien District, *H. T. Tsai 61694* (A), *61794* (A), *62964* (A).

6. **Fordiophyton begoniifolium** sp. nov.

Herba suffruticosa erecta simplex, caulibus superne parce glanduloso-setulosis; foliis membranaceis longe petiolatis inaequaliter ovatis, 6–8 cm. longis, 4–5 cm. latis, apice acuminatis, basi valde inaequaliter cordatis, margine obsolete setuloso-serrulatis, utrinque glabris, nervis principalibus 8–12, utrinque subelevatis, venulis indistinctis; petiolo 3–5.5 cm. longo, parce glanduloso-setoso; inflorescentiis terminalibus cymosis, pedunculis ad 3.5 cm. longis, parce glanduloso-setosis, circiter 4-floris, pedicellis ad 5 mm. longis, glanduloso-setosis; calycis tubo anguste infundibuliformi, 4-dentato, dentibus triangularibus, circiter 1.5 mm. longis; petalis roseis oblongo-ovatis, circiter 7 mm. longis et 4 mm. latis, apice acutis; staminibus inaequalibus, filamentis circiter 12 mm. longis; antheris majoribus linearibus 11 mm. longis basi bilobatis, minoribus oblongis 4 mm. longis basi haud bilobatis; stylis filiformibus, 12 mm. longis, stigmate inconspicuo.

YUNNAN: Chen-kang, Snow Range, Tapingchang, *T. T. Yü 17244* (TYPE, A), Aug. 6, 1938, a perennial herb, 1–2 ft. high, common in forests, alt. 2350 m., flowers pink; between Tengyueh and Lungling, *J. F. Rock 7188* (N), Oct.–Nov. 1922, in dense forest.

This species is well-characterized by its inequilateral *Begonia*-like leaves. *Rock 7188* is a sterile specimen.

12. STAPFIOPHYTON

Stapfiophyton nom. nov.

Gymnagathis Stapf, *Ann. Bot.* **4**: 315. 1892, non Schauer (1843).

The genus *Gymnagathis* was proposed by Stapf in 1892, its type being *Sonerila peperomiaefolia* Oliv. from Kwangtung. It is apparently in close relationship with *Phyllagathis* as the latter is currently interpreted, especially in the general habit and in the anther structure. It differs from *Phyllagathis*, however, in the acaulescent or subacaulescent habit, the cymose-subracemose instead of umbellate inflorescences, and in the eight stamens in two very unequal series. Diels (*Bot. Jahrb.* **65**: 112. 1932), although he accepts Stapf's genus, apparently saw no specimens representing the type species; at least he cites none. At the same time, he considerably amplified the scope of *Phyllagathis*, describing two new species, *P. elattandra* Diels and *P. tetrandra* Diels, one with eight very unequal stamens and the other with only four stamens and with cymose or racemose non-umbellate inflorescences, characters rather widely differing from those of other species of *Phyllagathis*. I believe that both of Diels' species belong in *Gymnagathis* Stapf rather than in *Phyllagathis* and accordingly transfer them.

Under the homonym rule *Gymnagathis* Stapf (1892) is an invalid generic name because of the earlier *Gymnagathis* Schauer, *Linnaea* **17**: 243. 1843, there fully described. Schauer's genus belongs in the Myrtaceae and is generally placed as a synonym of *Melaleuca* Linn. I therefore propose the new generic name *Stapfiophyton* to replace *Gymnagathis* Stapf (1892), non Schauer (1843).

A. Stamens 8, 4 long and 4 short.

B. Petioles long, 6–8 cm.1. *S. peperomiaefolium*.

BB. Petioles short, 0.5–1 cm.2. *S. elattandrum*.

AA. Stamens 4 only.3. *S. tetrandrum*.

1. **Stapfiophyton peperomiaefolium** (Oliv.) comb. nov.

Sonerila peperomiaefolia Oliv. in Hook. Ic. Pl. **19**: t. 1814. 1889.

Gymnagathis peperomiaefolia Stapf, Ann. Bot. **4**: 31. 1892; Cogn. in DC. Monogr.

Phan. **7**: 516. 1891; Guillaum. Bull. Soc. Bot. France **60**: 404. 1913; Diels, Bot.

Jahrb. **65**: 112. 1932.

KWANGTUNG: Hongkong, *C. Ford* (*Hongk. Herb.*) 336 (syntype of *Sonerila peperomiaefolia* Oliv., photo. N).

2. **Stapfiophyton elattandrum** (Diels) comb. nov.

Phyllagathis elattandra Diels, Bot. Jahrb. **65**: 117. 1932.

KWANGTUNG: Sin-fung District, Sha-lo Shan, *Y. W. Taam* 266 (A). Endemic.

Diels' type is *S. S. Sin* 5180 from Win-fu, Kwangtung.

3. **Stapfiophyton tetrandrum** (Diels) comb. nov.

Phyllagathis tetandra Diels, Bot. Jahrb. **65**: 117. 1932.

YUNNAN: Ho-kou, *H. T. Tsai* 52628 (A). Endemic.

Diels' types are *A. Henry* 10539 and 10539A from Mengtze, Yunnan.

13. PHYLLAGATHIS

Phyllagathis Blume, *Flora* **14**: 507. 1831.

The genus *Phyllagathis* has been considerably amplified since it was established by Blume in 1831. The type species, *Phyllagathis rotundifolia* Blume, was from Sumatra. Guillaumin records the species as also found in Kwangtung (Bull. Soc. Bot. France **60**: 273, 404. 1913) but cites no specimen. As Diels notes (Bot. Jahrb. **65**: 114. 1932), this record is apparently an error. The species is definitely known from Sumatra and Borneo only.

Eliminating for the present the various Malaysian species of *Phyllagathis*, I note that those recorded from southeastern continental Asia evidently need clarification. Stapf described *Phyllagathis tonkinensis* in 1892 from Indo-China. *Phyllagathis chinensis* Dunn in a synonym of *Sarcopyramis nepalensis* Wall. Another species, *Phyllagathis Cavaleriei*, was added by Guillaumin in 1913 from China, considered by him to be closely related to *Phyllagathis tonkinensis* Stapf. He also described an additional species from Indo-China, *Phyllagathis hirsuta* Guillaum. in Lecomte, Not. Syst. **2**: 325. 1913, non Cogn. = **Phyllagathis Guillauminii** nom. nov. It differs from other species of the genus in its lanceolate leaves, solitary or glomerulate flowers, and distinctly calcarate connectives. Merrill in 1930 described an anomalous species, *Phyllagathis oligotricha*, from Kwangtung. In Diels' paper of 1932 (Bot. Jahrb. **65**: 114. 1932), because of lack of access to the specimens, he does not include these last two species in

his key. No specimen of either species has been available to me for examination.

Diels in 1932 added three new species from China and deliberately enlarged the concept of the genus to accommodate them. Two of his species, *Phyllagathis elattandra* and *P. tetrandra*, with 8 very unequal stamens and 4 stamens respectively, and with cymose-paniculate instead of umbellate inflorescences, I have transferred to *Staphiophyton* (*Gymnagathis* Stapf). I judge from the description of *P. anisophylla* Diels, of which I have seen no specimens, that it too should probably be removed from *Phyllagathis*.

Merrill & Chun (Sunyatsenia 5: 147-149. 1940) describe three other anomalous species of *Phyllagathis* from Hainan and note the differences from the other representatives of the genus in their cymose-paniculate, more or less scorpioid inflorescences. These three species are clearly congeneric, and in an attempt to clarify the now too broad concept of *Phyllagathis*, they have been segregated to form, with two others, a new genus which I call *Scorpiothyrsus*. Thus with several species now removed from *Phyllagathis*, there remains for southeastern Asia *Phyllagathis tonkinensis* and *P. Cavaleriei*, which I believe should be retained in the genus. In addition, there are three more or less anomalous species, *P. Guillauminii*, *P. oligotricha*, and *P. anisophylla*, of which no specimens have been available to me for study.

Thus, in my opinion, the genus *Phyllagathis* is better delimited to include only those species with umbellate inflorescences, with equal or subequal stamens, and with inappendiculate or only slightly calcarate anthers. With this limitation the group can be differentiated from such allied genera as *Bredia*, *Staphiophyton*, etc.

1. *Phyllagathis Cavaleriei* (H. Lév. & Vaniot) Guillaum. in Lecomte, Not. Syst. 2: 325. 1913, Bull. Soc. Bot. France 60: 273, 404. 1913; H. Lév. Fl. Kouy-Tchéou 227. 1914; Diels, Bot. Jahrb. 65: 115. 1932; Hand.-Maz. Beih. Bot. Centralbl. 52B: 163. 1934; Rehd. Jour. Arnold Arb. 15: 113. 1934, 18: 227. 1937. *Allomorphia Cavaleriei* H. Lév. & Vaniot, Mém. Soc. Sci. Nat. Cherbourg 35: 394. 1906, Repert. Nov. Sp. 6: 94. 1907. *Oxyspora Cavaleriei* H. Lév. l.c. (1906) et (1907), pro syn. *Allomorphiae Cavaleriei*. *Phyllagathis Tankahkeei* Merr. Lingnan Sci. Jour. 7: 316. 1931.

KWEICHOW: Sanhoa, *Y. Tsiang* 6389 (N). KIANGSI: Lung-nan District, *S. K. Lau* 4544 (G). KWANGSI: No precise locality, *R. C. Ching* 5689 (N); Yung District, Ta Tse Shan, *Steward & Cheo* 933 (N); Ling-wan District, *S. K. Lau* 28427 (A), 28429 (A), 28430 (A), 28740 (A), 28741 (A); Hang-on-yuen, *Z. S. Chung* 81755 (A); Chuen Yuen, *Z. S. Chung* 82001 (A); Yao Shan, *C. Wang* 39150 (A), 39441 (A), 40033 (A); Shang-sze District, Shih Wan Tai Shan, *W. T. Tsang* 22647 (A); Kwei-lin District, Chin-kang Shan, *W. T. Tsang* 22990 (A), 28317 (A). KWANGTUNG: Yao Shan, Yen Wang Chai, *S. S. Sin* 9941 (N); Loh-chang, *C. L. Tso* 20995 (N). FUKIEN: Yenping, *H. H. Chung* 2862 (G).

Phyllagathis Cavaleriei var. *Wilsoniana* Guillaum. in Lecomte Not. Syst. 2: 325. 1913, Bull. Soc. Bot. France 60: 273, 404. 1913, based on *Wilson* 3647 of western Szechuan, apparently belongs to a different species. Diels (Bot. Jahrb. 65: 115. 1932) notes that it is beyond the range of the typical form of the species. Guillaumin's description is too short and incomplete

to permit further speculation as to the proper disposition of the variety; I have seen no material representing it. *Ching 5740*, a fruiting specimen which I have referred to the species, is almost glabrous and may possibly represent a form of *Phyllagathis Cavaleriei*.

2. *Phyllagathis ovalifolia* sp. nov.

Frutex parvus circiter 1 m. altus, caulibus dense hirsuto-setosis; foliis oppositis petiolatis subchartaceis, oblongo-ovatis, 10–13 cm. longis, 4–5.5 cm. latis, apice acutis, basi late acutis, margine integris, setosis, in sicco olivaceis, supra sparse hirsuto-setosis, subtus praecipue in venis venulisque setosis; petiolo 2–3.5 cm. longo, hirsuto-setoso; inflorescentiis umbellatis terminalibus, multifloris, pedunculis crassis circiter 1.5 cm. longis, dense hirsuto-setosis, apice valde dilatatis, pedicellis circiter 1.5 cm. longis, gracilibus, sparse pubescentibus; calyce infundibuliformi 5 mm. longo, membranaceo, subglabro, lobis triangularibus, 1.5 mm. longis, margine dense setosis; petalis ovatis, membranaceis, roseis, circiter 7.5 mm. longis et 4 mm. latis; staminibus 8, aequalibus, filamentis 5 mm. longis, antheris linearibus, acuminatis, 6 mm. longis, basi productis, connectivo postice breviter calcarato; stylis 1.1 cm. longis, stigmatibus indistinctis.

YUNNAN: Mengtze, *A. Henry 11035* (A, N); Ping-pien District, *H. T. Tsai 61456* (TYPE, A), Aug. 7, 1934, a shrub 3 ft. high, in woods, alt. 1400 m., flowers pink.

This species is characterized by its oblong-ovate leaves which are broadly acute at the base, short-pedunculate inflorescences, and slenderly pedicellate flowers with membranaceous calyx-tube and setose-margined calyx-lobes.

3. *Phyllagathis longipes* sp. nov.

Herba parva, rhizomate prostrato, caulibus ramulisque aereis 6–8 cm. longis, puberulis vel subglabris; foliis oppositis longe petiolatis plerumque inaequalibus, membranaceis ovatis, 7–14 cm. longis, 5–9.5 cm. latis, acuminatis, basi cordatis, 5–7-nerviis, margine setoso-denticulatis, in sicco olivaceis, supra sparse hirsuto-setosis, subtus praecipue in nervis venulisque puberulis, nervis venulisque transversis supra subconspicuis, subtus leviter elevatis; petiolo 8–20 cm. longo, gracili, puberulo; inflorescentiis umbellatis terminalibus, circiter 10-floris, pedunculis 12–15 cm. longis gracilibus puberulis, pedicellis 5–7 mm. longis, puberulis, basi minute bracteatis, bracteis caducis; calyce longe infundibuliformi, circiter 5 mm. longo, puberulo, margine minute 5-dentato; petalis roseis, ovatis, circiter 8 mm. longis et 5 mm. latis, acutis; staminibus 8, subaequalibus, filamentis circiter 5 mm. longis, aequalibus, antheris linearibus acutis haud appendiculatis, 4 majoribus 6 mm. longis, 4 minoribus 4 mm. longis, connectivo postice leviter calcarato; stylis 1 cm. longis, stigmatibus leviter capitato.

SZECHUAN: O-pien District, *Y. S. Liu 2241* (A), Sept. 1937, alt. 1300–1800 m. SIKANG: Kanting, Ta-kwan, Ta Hsiang Ling, *C. Y. Chiao 1625* (TYPE, A), Aug. 7, 1939, herb, growing under trees in dense shade near mountain stream, alt. 2900 m., flowers pinkish; Kanting, near Ta-kwan, *C. Y. Chiao 2047* (A), Aug. 28, 1939, herb, growing on rocky slopes, alt. 1610 m. YUNNAN: Liang Shan, I'cho, *H. T. Tsai 51295* (A), Aug. 13, 1932, herb, rare, in woodland, alt. 2100 m.

This species is characterized by its prostrate rooting stem and very long and slender petioles. The filaments are all of equal length, but four of the anthers are shorter than the others. The stigma is slightly capitate. *Tsai 51295* from Yunnan is a sterile specimen, but it undoubtedly represents this species.

4. *Phyllagathis setotheca* sp. nov.

Suffruticosa ad 1 m. alta, caulibus glabris vel valde minute stellato-pubescentibus; foliis aequalibus vel subaequalibus chartaceis petiolatis, oblongo-lanceolatis, 10–14 cm. longis, 2–4.5 cm. latis, acuminatis, basi acutis vel attenuatis, 3-nerviis marginalibus 2 gracilioribus additis, utrinque glabris vel minute stellato-pubescentibus, nervis transversis supra subconspicuis, subtus distinctis; petiolo 1–5 cm. longo; inflorescentiis terminalibus umbellatis glabris, pedunculis 3–4 cm. longis, multifloris, 4-bracteatis, bracteis subchartaceis, ovatis vel ovato-oblongis, 1.5–2 cm. longis, 1–1.5 cm. latis, glabris, late acutis vel acutis, pedicellis 1–1.8 cm. longis; calycibus turbinate membranaceis glabris, 6–8 mm. longis, margine 4-lobatis, lobis triangularibus acutis, 3–5 mm. longis, 2–3 mm. latis; petalis 4, ovatis, distincte membranaceis, 12–14 mm. longis, 7–9 mm. latis, acutis; staminibus 8, aequalibus, filamentis 5–6 mm. longis, antheris linearibus, 5–6 mm. longis, basi leviter incrassatis, connectivo sub theca antice haud appendiculato, postice distincte setoso-calcarato; stylis circiter 1.2 cm. longis, stigmatate indistincto; fructibus in calycibus inclusis, subquadrangularibus, 6–7 mm. longis, 3–4 mm. latis, glabris, capsulis 4-lobatis, apice valde concavis.

KWANTUNG: Shih Wan Tai Shan, *H. Y. Liang* 69817 (TYPE, A), July 21, 1931, herb in the shade of trees along streams.

INDO-CHINA: Tonkin, northeast of Mon-cay, Pac-si and vicinity, *W. T. Tsang* 26914 (A), Sept. 27–30, 1936, semi-woody, fairly common in thickets, fruit purplish red; Ha-Coi, Cha Uk Village near Chuk-phai, Taai Wong Mo Shan and vicinity, *W. T. Tsang* 28999 (A), 29059 (A), 29354 (A), May–July 1939, woody or semi-woody, 1–2 ft. high, fairly common, growing in thickets, flowers lavender, fragrant; Dam-ha, Sai Wong Mo Shan, Lung Wun Village, *W. T. Tsang* 30043 (A), 30349A (A), July 18 – Sept. 9, 1940.

This species is very different from other species of southeastern continental Asia, being nearly glabrous or more or less distinctly but minutely stellate-pubescent, with oblong-lanceolate leaves, prominent membranaceous bracts, and distinctly setose connectives.

5. *Phyllagathis stenophylla* (Merr. & Chun) comb. nov.

Bredia? *stenophylla* Merr. & Chun, *Sunyatsenia* 5: 146. 1940.

HAINAN: Yaichow, *H. Y. Liang* 62530 (HOLOTYPE, A); Kum-yun District, *H. Y. Liang* 63384 (A).

In the original description of the species, Merrill and Chun state, "In the absence of flowers we are not entirely sure as to the proper generic position of this rather strongly marked species, but believe it to belong in the genus *Bredia*." No new material is available, but as in its general appearance it approximates *Phyllagathis setotheca*, I feel safe in transferring it to this genus.

6. *Phyllagathis anisophylla* Diels, Bot. Jahrb. 65: 115. 1932.

HUNAN; based on *Hunan Museum* 60 & 170; no specimen seen.

Diels describes this plant as being ligneous, with unequal pairs of leaves, and with the connectives at the base of the anthers slightly thickened in front and long-calcarate behind; these characters indicate that it is probably not a *Phyllagathis*. No decision can be made, however, until the original specimens are examined.

7. *Phyllagathis oligotricha* Merr. ex Merr. & Chun, *Sunyatsenia* 1: 74. 1930.

KWANGTUNG; based on *C. L. Tso* 21016; no specimen seen.

Merrill states, "Because of its habit, the somewhat elongated stems being decumbent below and rooting at the nodes, its few branches (rather than being strictly simple), and its inflorescences consisting of three or five terminal umbels rather than a simple umbel, I am in some doubt as to the propriety of placing this species in *Phyllagathis*." The type specimen is not available for study.

14. SCORPIOTHYRSUS

Scorpiothyrsus gen. nov.

Inflorescentia terminalis paniculata gracilis longe pedunculata, ramulis scorpioideis, floribus tetrameris, parvis, breviter pedicellatis, scorpioideis vel subscorpioideis, in ramulis ultimis biseriatim dispositis; calycibus parce pubescentibus, tubo longe turbinato-campanulato, lobis ovatis, rotundatis vel acuminatis; petalis albis subreniformi-ovatis, rotundatis vel obscure apiculatis; staminibus 8. aequalibus, antheris oblongis obtusis, haud appendiculatis, connectivo haud calcarato; ovario 4-loculari, plane inferiore, stylis filiformibus, stigmatibus incrassatis; capsulis in calycibus inclusis, turbinatis, graciliter 8-costatis, apice rotundatis, haud depressis.

Suffruticosa, erecta, simplex vel ramosa, caulibus erectis, deorsum subteretibus, sursum sulcatis vel angularibus, glabris vel hirsuto-setosis; foliis oppositis, longe petiolatis, late ovatis, glabris vel pilosis vel ciliato-hirsutis, basi perspicue cordatis, 7-nerviis, margine denticulatis.

The generic name is from *σκόρπιος*, scorpion, and *θύρσος*, thyrsus, referring to the paniculate inflorescence with scorpioid branches.

In 1940, Merrill & Chun described three species of *Phyllagathis* from Hainan, which are more or less anomalous in the genus, for they noted that, "Most of the other species have umbellate and pseudo-umbellate inflorescences, while in these Hainan forms, the inflorescences are cymose-paniculate." Two additional species from Hainan are manifestly congeneric with these three. A new genus is here proposed for this group of species as a segregate from *Phyllagathis*. These species represent a very homogeneous group of suffruticose plants characterized by paniculate inflorescences with scorpioid branches. The flowers are arranged in two rows along one side of each branchlet; the lower flowers fall early, leaving only the pedicel-scars along the lower part of the branchlets. The flowers are small and rather densely arranged. The scorpioid character is very distinct in those species with long inflorescence-branches, but even in those species with short branchlets, a close examination will reveal the same character.

In the scorpioidly arranged flowers, this new genus is close to *Sonerila*, but the inflorescences are paniculate, the flowers being arranged in two ranks on the scorpioid branches. In *Sonerila* the flowers are usually in simple racemes or spikes. *Sonerila* has trimerous flowers, while in *Scorpiothyrsus* the flowers are tetramerous. In *Phyllagathis*, the inflorescences are umbellate or pseudo-umbellate and usually not branched, while that genus differs further from *Scorpiothyrsus* in the usually larger flowers with pink or violet petals, elongated linear and attenuate anthers, which are slightly gibbose in front at the base, and the connectives being shortly calcarate behind at the base of the anthers, while the fruits are somewhat exserted from the calyx-tube, 4-valved, and manifestly concave at the

center. In *Scorpiothyrsus*, the flowers are smaller and with white petals, the anthers short, oblong, obtuse and not gibbose in front at the base, the connectives not calcarate at the back, and the fruits more or less hemispherical, completely included in the calyx, rounded or subrounded at the top and not concave at the center. In the last characters it approaches more closely the Oxysporeae rather than most genera of the Sonerileae. Stapf describes a section *Scorpioides* (Ic. Pl. **25**: t. 2414. 1896) of the genus *Drissenia* Korth. from Borneo, as characterized by its scorpioid paniculate inflorescences. However, Korthals' genus, with 8 very unequal strikingly appendaged stamens, is very remote from this new genus.

Five species in Hainan. Type species: *Phyllagathis xanthosticta* Merr. & Chun.

KEY TO THE SPECIES

- A. Inflorescences many-branched, the ultimate branches long, definitely scorpioid; leaves glabrous.
 - B. Leaves large, 12–18 cm. \times 15–20 cm., with 2–6 rows of yellow spots on the upper surface paralleling the longitudinal nerves.1. *S. xanthostictus*.
 - BB. Leaves smaller, 10–13.5 cm. \times 6–10 cm., without yellow spots.2. *S. glabrifolius*.
 - AA. Inflorescences few-branched, the ultimate branches short, scorpioid to subscorpioid; leaves strigose above, pubescent beneath.
 - B. Leaves with very few hairs or glabrous on the upper surface. 3. *S. oligotrichus*.
 - BB. Leaves densely covered with hairs on the upper surface.
 - C. Hairs yellow, rather stiff.4. *S. xanthotrichus*.
 - CC. Hairs reddish, rather soft.5. *S. erythrotrichus*.
1. ***Scorpiothyrsus xanthostictus*** (Merr. & Chun) comb. nov.
Phyllagathis xanthosticta Merr. & Chun, Sunyatsenia **5**: 148. 1940.
 HAINAN: Po-ting, F. C. How 73725 (HOLOTYPE, A).

2. ***Scorpiothyrsus glabrifolius*** sp. nov.

Suffruticosa erecta, caulibus erectis, ad 22 cm. longis, ramis deorsum subteretibus, sursum sulcatis vel angularibus, ramulis ultimis 3 mm. diametro, parce hirsuto-setosis; foliis subchartaceis vel membranaceis, utrinque glabris, late ovatis, 10–13.5 cm. longis, 6–10 cm. latis, late acutis, basi rotundatis vel cordatis, 5–7-nerviis, margine irregulariter denticulatis, nervis transversis utrinque 20–25, distinctis, subparallelis, supra olivaceis, subtus pallidioribus; petiolo 4–6 cm. longo, parce hirsuto-setoso vel glabro; floribus ignotis; infructescentiis terminalibus, 3–6 cm. longis, paniculatis, fructibus parvis, breviter pedicellatis, scorpioideis, in ramulis ultimis biseriatim dispositis, calycibus persistentibus, 1.5 mm. longis, indistincte 5-lobatis, fructibus in calycibus inclusis, capsulis 4-locularibus apice rotundatis vel subrotundatis, haud depressis.

HAINAN: Po-ting, S. K. Lau 27966 (TYPE, A), Oct. 11, 1936, an erect herb, in dense woods, leaves green above, fruit pale yellow.

This species is close to *Scorpiothyrsus xanthostictus* in the long, distinctly scorpioid branches of the inflorescences, but it has smaller leaves, shorter petioles, smaller and shorter inflorescences, and smaller fruits, and it lacks the yellow spots on the leaves. It is a branching undershrub, while *S. xanthostictus* appears to be unbranched.

3. ***Scorpiothyrsus oligotrichus*** sp. nov.

Suffruticosa erecta simplex, caulibus brevibus ad 5 cm. longis, circiter 3 mm. diametro, consperse hirsuto-setosis; foliis membranaceis late ovatis, 8–13 cm. longis, 5.5–9.5 cm. latis, apice rotundatis vel late acutis, basi late cordatis, 7-nerviis, margine denticulatis, dentibus plerumque setosis, in sicco utrinque olivaceis, supra ad marginem paucè hirsuto-setosis, subtus consperse setosis, nervis transversis utrinque 18–22, perspicuis, reticulis laxis elevatis distinctis; floribus ignotis; infructescentiis terminalibus gracilibus, circiter 12 cm. longis, obscure hirsutis, paniculatis, ramulis ultimis circiter 5 mm. longis, subscorpioideis, fructibus subconfertis, in calycibus inclusis, pedicellis circiter 3 mm. longis, calycibus persistentibus, circiter 2 mm. longis, capsulis 4-locularibus, apice rotundatis vel subrotundatis, haud depressis.

HAINAN: Loktung, *S. K. Lau* 26924 (TYPE, A), May 27, 1936, herb, in dense woods, leaves yellowish green, fruit yellowish white.

This species is closely related to *S. xanthostictus* and *S. erythrotichus* in the short-branched inflorescences. It can be easily distinguished from these by the scattered setose hairs on the upper surface of the leaves.

4. *Scorpiothyrus xanthotrichus* (Merr. & Chun) comb. nov.

Phyllagathis xanthotricha Merr. & Chun, *Sunyatsenia* 5: 149. t. 23. 1940.

HAINAN: Po-ting, *F. C. How* 72690 (HOLOTYPE, A); Ling-shui, *C. Wang* (paratype, A, N).

5. *Scorpiothyrus erythrotichus* (Merr. & Chun) comb. nov.

Phyllagathis erythroticha Merr. & Chun, *Sunyatsenia* 5: 147. fig. 18. 1940.

HAINAN: Po-ting, *F. C. How* 72579 (HOLOTYPE, A).

15. SONERILA

Sonerila Roxburgh, Hort. Beng. 5. 1814, Fl. Ind. 1: 176. 1832.

Although the name *Sonerila* appears to be of quite frequent occurrence in the botanical literature of China, as Diels (Bot. Jahrb. 65: 117. 1932) notes, the actual number of species correctly referred to this genus as present in China is not many. He mentions only that *Sonerila tenera* Royle and *S. cantonensis* Stapf are found in the coastal regions of Kwangtung and describes a new species, *S. plagiocardia*, from Yunnan. It now seems that the genus is quite well-developed in southern as well as south-western China, although not so numerous in species as in the regions farther south; nine Chinese species are now recognized. In addition, *Sonerila laeta* Stapf, Kew Bull. 1906: 73. 1906, is described from plants raised from seeds collected by Wilson in China. No specimen is seen.

1. *Sonerila cantonensis* Stapf, Ann. Bot. 6: 302. 1892; Guillaum. Bull. Soc. Bot. France 60: 404. 1913; Merr. Lingnan Sci. Jour. 5: 138. 1927; Hand.-Maz. Sinensia 3: 196. 1933.

HAINAN: No precise locality, *C. Wang* 34735 (N), 35830 (N); Fan Ya, *F. A. McClure* 8409 (A, N); Tsing-leung Shan, *F. A. McClure* 6764 (N); Tam District, Hung Mo Shan, *Tsang & Fung* 561 = 18095 (A); Bak Sa, *S. K. Lau* 25863 (A). KWANGTUNG: Ting-wu Shan, *H. T. Ho* 60034 (N); Kao-yao District, *S. Y. Lau* 20286 (A, N); Wung-yuen District, *S. K. Lau* 1985 (G), 2186 (G), 2350 (G). KWANGSI: Ling-yün District, *Steward & Cheo* 681 (G); Shang-sze District, Shih Wan Tai Shan, *W. T. Tsang* 22646 (A), 23987 (A, N), 24462 (A, N), 24667 (A, N). FUKIEN: Gang Keu, *J. L. Gressitt* 1723 (G).

2. *Sonerila rivularis* Cogn. in DC. Monogr. Phan. **7**: 1182. 1891; Stapf, Ann. Bot. **6**: 302. 1892; Guillaum. in Lecomte, Fl. Gén. Indo-Chine **2**: 913. 1921.

KWANGSI: North of Hin Yen, *R. C. Ching* 6870 (N), 7049 (N). KWANGTUNG: Tai Mien Shan, Shih Wan Tai Shan, *H. Y. Liang* 69666 (A).

Indo-China.

This species is very close to *Sonerila cantonensis* Stapf, differing chiefly in the indumentum. *Sonerila cantonensis* Stapf has long hairs on the stems, petioles, veins on the lower surfaces of the leaves, and the calyces. The indumentum of *Sonerila rivularis* Cogn. is puberulent. It seems that the stamens are also slightly shorter in the latter species.

3. *Sonerila picta* Korth. Verh. Nat. Ges. Bot. 249. t. 52. 1839–42; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 536. 1879; Stapf, Ann. Bot. **6**: 302. 1892.

YUNNAN: Mengtze, *A. Henry* 9005 (A, N), 9005A (A); Szemao, *A. Henry* 12293A (N), 12293B (N); Che-li District, *C. W. Wang* 78518 (A).

A species of the Indo-Malayan region.

4. *Sonerila yunnanensis* J. Jeffrey, Notes Bot. Gard. Edinb. **8**: 207. 1914.

YUNNAN: Szemao, *A. Henry* 12337 (ISOTYPE, A); Che-li District, *C. W. Wang* 75860 (A), 76387 (A), 78191 (A), 79456 (A); Jenn-yeh District, *C. W. Wang* 80141 (A), 80417 (A), 80516 (A). Endemic.

5. *Sonerila plagiocardia* Diels, Bot. Jahrb. **65**: 117. 1932.

YUNNAN: Tengyueh, *G. Forrest* 26665 (isoparatype, N); Lu-se, *H. T. Tsai* 55923 (A).

6. *Sonerila epiloboides* Stapf & King ex King, Jour. As. Soc. Beng. **69**: 22. 1909.

YUNNAN: Ping-pien District, *H. T. Tsai* 61381 (A), 61864 (A), 61817 (A).

Malay Peninsula.

7. *Sonerila hainanensis* Merr. Philip. Jour. Sci. **23**: 256. 1923, Lingnan Sci. Jour. **5**: 138. 1927.

HAINAN: Five Finger Mt., *F. A. McClure* 9391 (ISOTYPE, A); Tingan, *S. P. Ko* 52247 (A, G, N); Lai Mo Leng, *J. L. Gressitt* 1122 (G). Endemic.

8. *Sonerila tenera* Royle, Ill. Bot. Himal. t. 45. 1834, 215. 1835;¹ Hance, Jour. Bot. **16**: 107. 1878; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 530. 1879; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 301. 1887; Stapf, Ann. Bot. **6**: 305. 1892; Guillaum. in Lecomte, Not. Syst. **2**: 328. 1913, Bull. Soc. Bot. France **60**: 404. 1913.

KWANGSI: Kwei-lin District, *W. T. Tsang* 28151 (A). KWANGTUNG: Lofaushan, *C. Ford* s. n. (N); Wung-yuen District, *S. K. Lau* 2311 (G). YUNNAN: Szemao, *A. Henry* 12564 (N); Che-li District, *C. W. Wang* 75961 (A), 79271 (A); Jenn-yeh District, *C. W. Wang* 79966 (A), 80296 (A); Chengkang, *T. T. Yü* 17535 (A).

India to southern China and the Philippines.

9. *Sonerila cheliensis* sp. nov.

Herba perennis erecta 6–12 cm. alta, caulibus plus minusve alatis, minute pubescentibus, superne pilis capitatis paucis instructis; foliis in jugis aequalibus vel subaequalibus dispositis, petiolatis membranaceis glabris ovatis, 1.5–3 cm. longis, 0.75–1.5 cm. latis, apice acutis, basi attenuatis, 3-nerviis, margine obscure ciliato-denticulatis vel subintegris, reticulis obscuris; petiolo 0.5–1 cm. longo; inflorescentiis terminalibus plerumque

¹For publication dates of the parts of Royle's "Illustrations," see Stearn in Jour. Arnold Arb. **24**: 484–487. 1943.

5-7-floris, pedunculis circiter 1.5 cm. longis, pedicellis 1-2 mm. longis, pedunculis pedicellis calycibusque pubescentibus pilis capitatis insuper parce instructis; calycibus cylindricis, 5 mm. longis, dentibus triangularibus acutis minutis, 0.5 mm. longis; petalis 3, oblongo-ellipticis, breviter acuminatis, 3.5 mm. longis; staminibus 3, antheris ovoideis, 1 mm. longis, apice acutis, basi cordatis, filamentis 1.5 mm. longis; stylo 2.5 mm. longo, stigmatibus subcapitato; capsulis circiter 1.8 cm. longis.

YUNNAN: Che-li District, Sheau-meng-yeang, *C. W. Wang* 75962 (TYPE, A), Sept. 1936, herb, on mountain slopes in woods, alt. 1000 m., flowers pinkish red; Che-li District, Ban-chiou-chian, *C. W. Wang* 79709 (A), Oct. 1936, in mixed forest, alt. 840 m., flowers red; Che-li District, You-louh Shan, *C. W. Wang* 78162 (A), Sept. 1936, in woods, alt. 1415 m., flowers red.

This species is related to *S. tenera* Royle, differing from it in the winged stem without long hairs and in the larger and much broader leaves, as well as in the larger flowers.

16. ANPLECTRUM

Anplectrum A. Gray, Bot. U. S. Expl. Exped. **1**: 597. 1854.

1. **Anplectrum glaucum** (Jack) Triana, Trans. Linn. Soc. **28**: 84. 1871; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 545. 1879; Cogn. in DC. Monogr. Phan. **7**: 566. 1891; Guillaum. in Lecomte, Fl. Gén. Indo-Chine **2**: 918. 1921; Merr. & Chun, Sun-yatsenia **5**: 144. 1940.

Melastoma glaucum Jack, Trans. Linn. Soc. **14**: 15. 1823.

Osbeckia tetrandra Roxb. Hort. Beng. 88. 1814, nom. nud., Fl. Ind. ed. 2, **2**: 224. 1832.

Dissochaeta glauca Blume, Flora **14**: 501. 1831.

HAINAN: No precise locality, *C. Wang* 33290 (N); Loktung, *S. K. Lau* 27156 (A). Tenasserim and Indo-China to Malay Peninsula, Sumatra, Borneo, and Java.

17. MEDINILLA

Medinilla Gaudichaud, Bot. Freycinet Voy. 484. t. 106. 1826.

Only two species of *Medinilla* have hitherto been referred to this genus as occurring in China, both from the Island of Hainan. The present study reveals that this tropical genus is fairly well-represented in southern China, especially in southern Yunnan. Seven species are here recorded, and a key to the Chinese species is given. In addition, *T. T. Yü* 20456 from north-eastern Yunnan and *H. T. Tsai* 60315 from southern Yunnan apparently represent additional species in this genus, but the specimens are too incomplete for other than generic determination.

A. Flowers in terminal panicles or lateral cymes.

B. Flowers in large terminal panicles only; leaves membranaceous, sessile, cordate.1. *M. Spirei*.

BB. Flowers in small terminal cymose panicles and in lateral cymes.

C. Leaves membranaceous, petiolate, long-acuminate; branches not fleshy. ...2. *M. septentrionalis*.

CC. Leaves chartaceous, subsessile, acute; branches fleshy. ...3. *M. himalayana*.

AA. Flowers in axillary cymes only.

B. Young branches terete.

C. Leaves sessile or subsessile.4. *M. hainanensis*.

CC. Leaves distinctly petiolate.

D. Leaves obovate, rounded to subacute.5. *M. radicans*.

DD. Leaves oblong-ovate to oblong-lanceolate, long-acuminate. 6. *M. erythrophylla*.

BB. Young branches 4-angled.

C. Leaves large, 15–20 cm. long; young branches winged. 7. *M. Tsaii*.

CC. Leaves 9–13 cm. long; young branches not winged. 8. *M. yunnanensis*.

1. ***Medinilla Spirei*** Guillaum. in Lecomte Fl. Gén. Indo-Chine **2**: 921. 1921.

YUNNAN: Ping-pien District, *H. T. Tsai* 60888 (A). KWANGSI: Bako Shan, western Poseh, *R. C. Ching* 7536 (N); Pin-lam, *S. P. Ko* 55588 (A). HAINAN: Kan-en District, *S. K. Lau* 3793 (A), 5240 (A).

Indo-China. New to China.

A distinct species, characterized by the membranaceous, cordate, sessile leaves and large terminal panicles.

2. ***Medinilla septentrionalis*** (W. W. Smith) comb. nov.

Oritrephes septentrionalis W. W. Smith, Jour. As. Soc. Beng. II. **7**: 69. 1911.

Medinilla caerulea Guillaum. in Lecomte, Fl. Gén. Indo-Chine **2**: 921. 1921, syn. nov.

Medinilla caerulea var. *nuda* Craib, Fl. Siam. Enum. **1**: 699. 1931, syn. nov.

Anplectrum yunnanense Kränzl. Viert. Nat. Ges. Zürich **76**: 153. 1931, syn. nov.

YUNNAN: Szemao, *A. Henry* 11705 (isotype of *Anplectrum yunnanense* Kränzl., A), 11705B (A), 11705C (A, N), 11705D (A); no precise locality, *G. Forrest* 26642 (A, N), 27163 (A, N); Fo-hai, *C. W. Wang* 77199 (A); Che-li District, *C. W. Wang* 78399 (A), 79515 (A); Jenn-yeh District, *C. W. Wang* 80282 (A), 80830 (A); Lung-ling District, *H. T. Tsai* 55666 (A); Lu-se District, *H. T. Tsai* 56353 (A), 56796 (A), 56860 (A), 56910 (A), 56951 (A). KWANGSI: West of Poseh, Bako Shan, *R. C. Ching* 7519 (N); Yao Shan, *C. Wang* 39025 (A), 39936 (A); Tai Ching Shan, Nor Yut, *S. P. Ko* 55362 (A).

Indo-China, Upper Burma, northern Siam.

A distinct species, characterized by the relatively small, membranaceous, long-acuminate leaves. The connectives are elongated below the anther and strongly 2-tuberculate in front and shortly calcarate behind. I follow Guillaumin in placing this species in *Medinilla*, although it is somewhat anomalous in the genus. *Oritrephes* is a small genus established by Ridley for certain Malayan species. It belongs to the Oxysporeae, while the present species clearly belongs in the Medinilleae. The equal or nearly equal stamens and the axillary as well as terminal inflorescences immediately remove it from *Anplectrum*, where Kränzlin placed it.

3. ***Medinilla himalayana*** Hook. f. ex Triana, Trans. Linn. Soc. **28**: 88. 1871; C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 549. 1879.

YUNNAN: Che-li District, *C. W. Wang* 7828 (A).

Himalayan region; new to China.

A species characterized by the presence of both terminal and lateral paniculate cymes.

4. ***Medinilla hainanensis*** Merr. & Chun, Sunyatsenia **2**: 292. t. 64. 1935.

HAINAN: Fan Yah, *N. K. Chun* & *C. L. Tso* 44185 (ISOTYPE, A). Known from the original collection only.

5. ***Medinilla radicans*** Blume, Flora **14**: 509. 1831, Rumphia **1**: 15. t. 3. 1835; Cogn. in DC. Monogr. Phan. **7**: 573. 1891; Guillaum. in Lecomte, Fl. Gén. Indo-Chine **2**: 922. 1921; Merr. Lingnan Sci. Jour. **6**: 283. 1930.

HAINAN: No precise locality, *C. Wang* 32296 (A, N), 34216 (A, N); Loktung,

S. K. Lau 27167 (A), 27346 (A); Ngai District, *S. K. Lau* 138 (N), 15846 (A), 15847 (A), *H. Fung* 20066 (A, N); Liamui, *J. L. Gressitt* 1157 (A); Lam-ko District, *W. T. Tsang* 348 (A, N); Yaichow, *F. C. How* 70716 (A, N), 70968 (A, N), *H. Y. Liang* 62056 (N); Po-ting, *F. C. How* 72849 (A); Dung Ka to Wen Fa Shi, *N. K. Chun* & *C. L. Tso* 43686 (A, N), 43696 (A, N); Seven Finger Mts., *H. Y. Liang* 61773 (A, N).

Indo-China, Java.

Merrill (l. c.), in first crediting this species to Hainan on the basis of *Tsang* 15847, comments: "This appears safely to be the same species as the Indo-China form referred by Guillaumin to Blume's species although there is some doubt as to the correctness of his interpretation."

6. *Medinilla erythrophylla* Lindl. Bot. Reg. **24**: Misc. 85. 1838; Paxt. Mag. Bot. **10**: 79. 1 t. 1843; Lemaire, Hort. Univ. **5**: 72. 1 t. 1844; Merr. Brittonia **4**: 127. 1941.

Melastoma? erythrophyllum Wall. List no. 4085. 1830, nom. nud.

Medinilla rubicunda sensu C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 547. 1879; Cogn. in DC. Monogr. Phan. **7**: 581. 1891; non Blume.

YUNNAN: Kiukiang Valley (Taron), *T. T. Yü* 19918 (A), 19925 (A).

Himalayan region, eastern Bengal, and Upper Burma; new to China.

Merrill has clarified the status of this species, which was previously confused with the distinctly different *Medinilla rubicunda* Blume (*M. Hasseltii* Blume). He says: "The species is allied to *Medinilla Hasseltii* Blume, but the geographical ranges of the two are very different. . . . It should be noted that the type of *Melastoma rubicundum* Jack = *Medinilla rubicunda* (Jack) Blume, came from Singapore, and that Ridley does not admit the species, as interpreted by Clarke and Cogniaux, in his flora of the Malay Peninsula. Jack's original description applies strictly to the common Malaysian form later characterized as *Medinilla Hasseltii* Blume . . ."

7. *Medinilla Tsaii* sp. nov.

Frutex scandens circiter 30 cm. altus, ramis junioribus quadrangularibus, alatis, alis crispis; foliis chartaceis, sessilibus vel subsessilibus, oblongo-ovatis, 13–20 cm. longis, 5.5–8 cm. latis, acutis vel acuminatis, basi acutis, 3-nerviis, marginalibus 2 gracilioribus additis, venis lateralibus tertiariisque obsoletis; inflorescentiis ignotis; infructescentiis lateralibus cymosis, 5–6 cm. longis, pedunculis 1–1.5 cm. longis, pedicellis 1–1.2 cm. longis; fructibus oblongo-turbinatis, 1 cm. longis, 6 mm. latis, 4-locularibus, calycis margine persistente, 2–3 mm. longo, membranaceo, integro.

YUNNAN: Ma-kwan District, *H. T. Tsai* 51846 (TYPE, A), March 1, 1933, a prostrate undershrub 1 ft. high, on rocks in woods, alt. 1800 m., fruit reddish green.

A species characterized by the strongly winged branches, large sessile leaves, and oblong fruit with persistent calyx-margins.

8. *Medinilla yunnanensis* sp. nov.

Frutex ad 2 m. altus, ramis plus minusve carnosis, ramulis 4-angularibus; foliis subchartaceis, breviter petiolatis, oblongo-ovatis, 10–13 cm. longis, 3.5–4.5 cm. latis, breviter acuminatis, basi acutis, 3-nerviis, venis lateralibus utrinsecus circiter 10, subconspicuis vel obscuris, venis tertiariis obsoletis; petiolo circiter 5 mm. longo; inflorescentiis lateralibus cymosis sessilibus, 2–4-floris, pedicellis 4–5 mm. longis; calyce turbinato, circiter 4 mm. longo, margine integro; petalis 4, obovatis, membranaceis, 5–6 mm.

longis, 3 mm. latis; staminibus 8, aequalibus, filamentis 2–3 mm. longis, antheris linearibus, 5–6 mm. longis, connectivo sub theca haud elongato, antice leviter 2-tuberculato, postice breviter calcarato; stylo circiter 1.1 cm. longo; fructibus ovoideis vel subglobosis, 6–8 mm. diametro, 4-locularibus.

YUNNAN: Szemao, *A. Henry* 10275 (TYPE, A, isotype, N), 10275A (A, N), a shrub 2–6 ft. high, alt. 5000 ft., flowers pink; Tsang-yuan, *C. W. Wang* 73270 (A), April, 1936, in oak woods, alt. 1550 m.

This species resembles *Medinilla hainanensis* Merr. but is distinguished by its sessile inflorescences.

18. PTERNANDRA

Pternandra Jack, Malay. Misc. 2(7): 60. 1822.

1. **Pternandra caerulea** Jack, Malay. Misc. 2(7): 61. 1822; C. B. Clarke in Hook. f. Fl. Brit. Ind. 2: 551. 1879; Triana, Trans. Linn. Soc. 28: 153. 1871; Guillaum. in Lecomte, Fl. Gén. Indo-Chine 2: 924. 1921; Merr. Lingnan Sci. Jour. 13: 65. 1934.

HAINAN: Hung Mo Shan, north of Fan Ta, *Tsang & Fung* 18034 (A).

Merrill, in recording this specimen as a *Pternandra*, says, "The specimen is in fruit but probably represents Jack's species at least as it is interpreted by Guillaumin."

19. MEMECYLON

Memecylon Linnaeus, Sp. Pl. 349. 1753.

KEY TO THE CHINESE SPECIES

- A. Leaves dark olivaceous or blackish, smooth and shining above.
 - B. Leaves dark-brown-olivaceous, chartaceous, 3.5 cm. long or less; fruits yellowish.1. *M. pauciflorum*.
 - BB. Leaves blackish, 3.5–6 cm. long; fruits blackish.
 - C. Fruits smooth, several together.2. *M. nigrescens*.
 - CC. Fruits 8-costate, usually single.3. *M. octocostatum*.
 - AA. Leaves yellowish to pale olivaceous when dry, usually glandular and not shining above.
 - B. Flowers few (less than 15), peduncles long or very short.
 - C. Leaves large, about 8.5 × 4.5 cm. or larger.
 - D. Leaves 8.5 cm. or less long; inflorescences short(2–3 mm.)-pedunculate.4. *M. floribundum*.
 - DD. Leaves 9–13 cm. long, inflorescences long(10–15 mm.)-pedunculate.5. *M. hainanense*.
 - CC. Leaves about 5.5 × 2.5 cm. or less.
 - D. Leaves ovate, 3 cm. or less long; fruits 8–9 mm. in diameter.6. *M. scutellatum*.
 - DD. Leaves oblong-lanceolate, 7–8 cm. long; fruits 6–7 mm. in diameter.7. *M. ligustrifolium*.
 - BB. Flowers numerous (15–50), glomerulate, very short(2–3 mm.)-pedunculate.8. *M. polyanthum*.
 1. **Memecylon pauciflorum** Blume, Mus. Bot. Lugd.-Bat. 1: 356. 1851; C. B. Clarke in Hook. f. Fl. Brit. Ind. 2: 555. 1879; Triana, Trans. Linn. Soc. 28: 158. 1871; Cogn. in DC. Monogr. Phan. 7: 1169. 1891; Guillaum. Bull. Soc. Bot. France 60: 338, 405. 1913, in Lecomte, Fl. Gén. Indo-Chine 2: 928. 1921; Merr. Lingnan Sci. Jour. 5: 139. 1927.
- HAINAN: No precise locality, *A. Henry* 8349 (G); Wen-chang District, *H. Fung* 20329 (A, N); Lan-ko District, *W. T. Tsang* 17440 (A).
- Indo-China, Siam, India, Malaysia and northern Australia.

2. **Memecylon nigrescens** Hook. & Arn. Bot. Beechey Voy. 186. 1833; Triana, Trans. Linn. Soc. **28**: 159. 1871; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 302. 1887; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Merr. Lingnan Sci. Jour. **13**: 65. 1934.

KWANGTUNG: Hongkong, *Hongk. Herb.* 1070 (A), 9561 (A); Tai-O, *W. Y. Chun* 3150 (N); Luichow, *Y. Tsiang* 2538 p. p. (N). HAINAN: No precise locality, *H. Y. Liang* 64158 (A, N), *C. Wang* 33317 (A, N), 33660 (N); Lingshui, *F. C. How* 73788 (A); Loktung, *S. K. Lau* 27017 (A); Dung Ka to Wen Fa Shi, *N. K. Chun & C. L. Tso* 43671 (A, N), 43767 (A, N).

3. **Memecylon octocostatum** Merr. & Chun, *Sunyatsenia* **2**: 294. 1935.

HAINAN: No precise locality, *H. Y. Liang* 63312 (A, N), 66465 (N), *C. Wang* 34456 (A, N); Loktung, *S. K. Lau* 27133 (N), 27347 (N); Kan-en District, *S. K. Lau* 3475 (A); Chank-kiang District, *S. K. Lau* 1460 (A, N), 2981 (A); Yaichow, *N. K. Chun & C. L. Tso* 44589 (ISOTYPE, A), *H. Y. Liang* 63018 (N).

In its vegetative characters, this species closely resembles *M. pauciflorum* Blume, but it is strongly characterized by its 8-costate fruits.

4. **Memecylon floribundum** Blume, Mus. Bot. Lugd.-Bat. **1**: 361. 1851; Triana, Trans. Linn. Soc. **28**: 158. 1871; Guillaum. Bull. Soc. Bot. France **60**: 337, 405. 1913; in Lecomte, *Fl. Gén. Indo-Chine* **2**: 927. 1921.

HAINAN: Chang-kiang District, *S. K. Lau* 1789 (A, N); Kumyun, *S. K. Lau* 27621 (A); Yaichow, *N. K. Chun & C. L. Tso* 44629 (A, N).

5. **Memecylon hainanense** Merr. & Chun, *Sunyatsenia* **2**: 44. 1934.

HAINAN: No precise locality, *C. Wang* 34211 (A, N), 34514 (A, N), 34575 (A, N), 36241 (A, N); Chang-kiang District, *S. K. Lau* 1797 (A, N); Bak-sa, *S. K. Lau* 26546 (A); Po-ting, *S. K. Lau* 28059 (A); Yaichow, *F. C. How* 70619 (A, N); Seven Finger Mts., *H. Y. Liang* 61782 (ISOTYPE, A).

6. **Memecylon scutellatum** (Lour.) Naud. Ann. Sci. Nat. III. Bot. **18**: 282. 1852; Cogn. in DC. Monogr. Phan. **7**: 1157. 1891; Merr. & Chun, *Sunyatsenia* **1**: 75. 1930; Merr. Lingnan Sci. Jour. **13**: 66. 1934, Trans. Am. Philos. Soc. II. **24**(2): 288. 1935.

Scutula scutellata Lour. Fl. Cochinch. 235. 1790.

Memecylon edule Roxb. var. *scutellata* C. B. Clarke in Hook. f. Fl. Brit. Ind. **2**: 564. 1879; Guillaum. Bull. Soc. Bot. France **60**: 339. 1913, in Lecomte, *Fl. Gén. Indo-Chine* **2**: 935. 1921.

KWANGTUNG: Hongkong, *C. Ford* s. n. (N); Kochow, *Y. Tsiang* 230 (N), 898 (A, N), 2246 (N); Luichow, *Y. Tsiang* 2358 p. p. (N); Ho-po District, *H. Y. Liang* 29353 (A). KWANGSI: Nanning to Shang-sze, *R. C. Ching* 7757 (A, N). HAINAN: No precise locality, *H. Y. Liang* 64543 (N), 65066 (N), 66153 (N), 66272 (A, N), *C. Wang* 32755 (N), 32759 (N), 33202 (A, N), 34896 (A, N), 36487 (A, N); Tai Un, *F. A. McClure* 7740 (A, N); Ching-mai District, *C. I. Lei* 104 (A, N); Ling-shui District, *F. A. McClure* 22120 (A, N); Kumyun, *S. K. Lau* 27797 (A); Kan-en District, *S. K. Lau* 3751 (A); Chang-kiang District, *S. K. Lau* 2867 (A); Ngai District, *S. K. Lau* 170 (A, N); Tan District, *S. K. Lau* 1012 (A, N), *J. L. Gressitt* 878 (A), *W. T. Tsang* 15292 (A, N), 16797 (A); Po-ting, *F. C. How* 72779 (A); Yaichow, *F. C. How* 70866 (A, N), *N. K. Chun & C. L. Tso* 44576 (A, N), 44791 (A, N), *H. Y. Liang* 61915 (A, N), 61916 (A, N), 62488 (N); Seven Finger Mts., *H. Y. Liang* 61758 (A, N).

Burma, Indo-China, and Malay Peninsula.

7. **Memecylon ligustrifolium** Champ. ex Benth. in Hook. Kew Jour. Bot. **4**: 117. 1852; Benth. Fl. Hongk. 117. 1861; Triana, Trans. Linn. Soc. **28**: 156. 1871; Forbes & Hemsl. Jour. Linn. Soc. Bot. **23**: 302. 1887; Guillaum. Bull. Soc. Bot. France **60**: 338, 405. 1913; Chung, Mem. Sci. Soc. China **1**: 185. 1924; Merr. Lingnan Sci. Jour. **5**: 139. 1927.

Memecylon scutellatum sensu Hook. & Arn. Bot. Beechey Voy. 186. 1833; Seem. Bot. Herald Voy. 378. 1857; non Naud.

YUNNAN: Fo-hai, C. W. Wang 74432 (A), 74755 (A), 74971 (A), 76177 (A). KWANGSI: South of Nanning, Shih Wan Tai Shan, R. C. Ching 8109 (A, N), 8263 (A, N); Shang-sze District, Shih Wan Tai Shan, W. T. Tsang 24572 (A, N). KWANG-TUNG: Hongkong, C. Ford s. n. (A), Herb. Hongk. 5241 (A), W. L. Brigham s. n. (G), Y. Tsiang 54 (A), 699 (A), W. Y. Chun 5105 (A), N. K. Chun 40266 (A); Canton, C. O. Levine 388 (A, G), 1709 (A, G), 2078 (A), 2108 (A, G); Ting-wu Shan, T. Sampson (Herb. Hance) 673 (G); C. O. Levine 758 (A, G), W. Y. Chun 6489 (A), H. T. Ho 60027 (N); Wung-yuen District, S. K. Lau 2392 (A); Kao-yao District, S. Y. Lau 20192 (A, N); Hwei-yang District, W. T. Tsang 25661 (A); Ying-tak District, Y. F. Chun 30410 (N). HAINAN: No precise locality, H. Y. Liang 62637 (N), 63625 (N), 64159 (N), 64369 (N), C. Wang 34381 (N), 34721 (N), 35910 (A, N), 36061 (A, N); Po-ting, F. C. How 72799 (A); Hung Mo Tung, Ip Yuk Shing 18347 (N); Ngai District, S. K. Lau 66 (A, N); Kan-en District, S. K. Lau 3566 (A), 5085 (A); Bak Sa, S. K. Lau 26594 (A); Loktung, S. K. Lau 27521 (A); Kumyun, S. K. Lau 27758 (A).

8. *Memecylon polyanthum* sp. nov.

Frutex 2–3.5 m. altus, ramis ramulisque teretibus, ramulis ultimis circiter 1 mm. diametro; foliis coriaceis elliptico-ovatis, 5–8 cm. longis, 2–3 cm. latis, haud nitidis vel subnitidis, longe acuminatis, basi acutis, in sicco supra subbrunneis, subtus pallidioribus, costa supra impressa, subtus perspicua elevata, nervis venulisque obscuris; petiolo 3–5 mm. longo; inflorescentiis axillaribus, multifloris (15–50), densis, subglobosis, circiter 1.5 cm. diametro, e cymis brevibus fasciculatis multifloris compositis; pedunculis vix 2–3 mm. longis; floribus breviter pedicellatis (2–3 mm.), 4-meris, altis, bracteolis minutis basilaribus; calycibus circiter 1.5 mm. longis, tubo 1–1.5 mm. diametro, breviter 4-denticulato; petalis late ovatis acutis, 1.5 mm. longis et latis; filamentis 8, 2 mm. longis; stylis 3–4 mm. longis.

YUNNAN: Che-li District, Sheau-meng-yeang, C. W. Wang 75514 (A), 79634 (TYPE, A), 81021 (A), a shrub 6–10 ft. high, mountain slopes, in woods, alt. 900–1000 m., flowers white; Che-li District, Dah-meng-lung, C. W. Wang 77707 (A), Aug. 1936, 2 m. high, in thickets, alt. 960 m.

A species characterized by its numerous flowers densely arranged in glomerulate inflorescences, remote from all the other known Chinese species.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

PLANTS OF COAHUILA, EASTERN CHIHUAHUA, AND ADJOINING ZACATECAS AND DURANGO, III

IVAN M. JOHNSTON

CYPERACEAE

by H. K. SVENSON

Cyperus (*Eucyperus*) **esculentus** L. Sp. Pl. 45 (1753).

COAHUILA: Sierra del Carmen, Sept. 8, 1936, *Marsh* 748; Sierra Cruces, near Santa Elena, in arroyo, not common, *Stewart* 288, 2176. CHIHUAHUA: 5 km. north of Escobillas, frequent on silty flat, *Stewart* 2372; Pirámide, moist heavy soil near ranch, *Johnston* 8138; 7½ mi. south of Pirámide, moist silty flat above labor, *Johnston* 8105a; 10 mi. southeast of Organos, locally common in low ground at foot of slope, *Stewart & Johnston* 2035; 12 mi. south of Camargo, *White* 2226.

Widely distributed in America and in the Old World.

Cyperus (*Eucyperus*) **acuminatus** Torr. & Hook. Ann. Lyc. N. Y. 3: 435 (1836).

COAHUILA: Mesa Grande, about 40 km. northwest of Hac. Encantada, in water of tinaja, fairly common, *Stewart* 1638; along trail from southern extremity of Hillcoat Mesa to Buena Vista headquarters, July 27, 1938, *Marsh* 1491.

Widely distributed across southern parts of the United States. Marsh's material is referable to the var. *cyrtolepis* (Torr. & Hook.) Kükenth.

Cyperus (*Eucyperus*) **ochraceus** Vahl, Enum. 2: 325 (1806).

COAHUILA: Muzquiz Swamp, 1936, *Marsh* 889.

Louisiana and eastern Texas south through eastern Mexico to Argentina.

Cyperus (*Eucyperus*) **amabilis** Vahl, Enum. 2: 318 (1806).

CHIHUAHUA: Hills northwest of Chihuahua, damp gravelly places on ledges, *Pringle* 911.

The cited specimen belongs to the var. *macrostachyus* (Boeck.) Kükenth. The species is widespread in the tropics of both hemispheres.

Cyperus (*Eucyperus*) **seslerioides** H.B.K. Nov. Gen. et Sp. 1: 209 (1815).

CHIHUAHUA: Hills northeast of Chihuahua, Sept. 16, 1885, *Pringle* 554.

Trans-Pecos Texas (Big Bend) and Arizona, south through Mexico to Venezuela.

Cyperus (*Juncellus*) **laevigatus** L. Mant. Pl. 179 (1771).

CHIHUAHUA: Lake Santa Maria, *Nelson* 6417; 3 mi. west of Camargo, *White* 2267a.

Ranging from Texas to California and southward; of world-wide distribution in the tropics, usually in saline or brackish situations.

Cyperus (*Pycneus*) **niger** R. & P. Fl. Peruv. 1: 47 (1798).

COAHUILA: Saltillo, shallow muddy creek, 1898, *Palmer* 177; Jimulco, warm springs, May 13, 1885, *Pringle* 124. CHIHUAHUA: Valley near Chihuahua, wet places, Sept. 27, 1886, *Pringle* 809; Presa de Chihuahua, 1936, *LeSueur* 1108; 3 mi. west of Camargo, *White* 2267.

Ranging from Texas to California and south into South America. The

Chihuahua material cited is referable to the var. *castaneus* (Wats.) Kükenth.

Cyperus (*Pycnus*) **albomarginatus** Mart. & Schrad. ex Nees in Mart. Fl. Bras. 2(1): 9 (1842).

CHIHUAHUA: Wet places in the mountains northwest of Chihuahua, Oct. 7, 1886, *Pringle* 810.

Widely distributed in the tropics of both hemispheres; extending north through Mexico into the southern parts of United States.

Cyperus (*Mariscus*) **tenuis** Swartz, Prodr. Veg. Ind. Occ. 20 (1788).

COAHUILA: Sierra del Carmen, Sept. 12, 1936, *Marsh* 835; Muzquiz Swamp, 1936, *Marsh* 934; Cañon Bocatoche, scattered along rocky arroyo on valley floor, *Muller* 3109.

Widely distributed in the tropics of America and west Africa. Muller's collection is immature and its identification is somewhat doubtful; it was originally identified as *C. uniflorus* var. *pseudothyrsiflorus* Kükenth., but it does not have the hardened scales characteristic of *C. uniflorus*. The Coahuilan collections cited possibly can be referred to *C. breviradiatus* Liebm.

Cyperus (*Mariscus*) **spectabilis** Link, Hort. Berol. 1: 318 (1827).

COAHUILA: Sierra del Carmen, Cañon Sentenela, moist stream-side, *Wynd & Mueller* 595; Zacate, *Marsh* 511; Cañon Bocatoche, scattered on grassy valley floor, *Muller* 3134; Sierra del Pino, near La Noria, gravelly arroyo banks, *Stewart* 1216, *Johnston & Muller* 455; tableland north of Cañon del Cuervo Chico, base of low rounded limestone hills, gravelly places, *Johnston* 8561. CHIHUAHUA: Sierra R'ca, Cañon Madera, frequent in wet rocky arroyo, *Stewart* 2494; Pirámide, moist rocky place near hacienda, *Johnston* 8130a; canyon west of Organos, gravelly arroyo banks with *Acacia*, *Stewart & Johnston* 2076; rocky hills near Chihuahua, *Pringle* 311; western base of Sierra Santa Eulalia, south of Potosi Mill, about north-facing ledges, fairly common, *Stewart & Johnston* 2115. ZACATECAS: Valley 15 km. west of Concepcion del Oro, *Stanford et al.* 523.

Ranging from Oklahoma and Arizona south to southern Mexico.

Cyperus (*Mariscus*) **apiculatus** Liebm. Vidensk. Selsk. Skr. Kjobenh. V.2: 220 (1851).

CHIHUAHUA: Samalayuca, sand dunes, 1935, *LeSueur* 1720.

Known only from Mexico.

Cyperus (*Mariscus*) **Fendlerianus** Boeckl. Linnaea 35: 520 (1868).

COAHUILA: Sierra del Carmen, Sept. 7, 1936, *Marsh* 801; Sierra del Carmen, Cañon Sentenela, *Wynd & Mueller* 512, 580; Hac. La Babia, open valley floor, *Wynd & Mueller* 654; Sierra del Pino, La Noria, flats in dry pine woods, *Johnston & Muller* 540. CHIHUAHUA: Pirámide, about rock masses, *Johnston* 8127, 8130; 7½ mi. south of Pirámide, moist silty flat above labor, *Johnston* 8105; Sierra Virulento, 2-3 mi. east of Rancho Virulento, rocky slopes and ridges, *Johnston* 8072a, 8074; sand dunes, Samalayuca, 1935, *LeSueur* 1724; rocky hills near Chihuahua, 1885, *Pringle* 310; western base of Sierra Santa Eulalia, south of Potosi Mill, about north-facing ledges, rare, *Stewart & Johnston* 2116.

Ranging from Texas to Arizona and south to southern Mexico. The cited collection from the Sierra del Pino is typical *C. Fendlerianus*. The other collections have conspicuously pedunculate clusters of spikelets and belong to the var. *debilis* (Britt.) Kükenth.

Cyperus (*Mariscus*) **Mutisii** (H.B.K.) Griseb. Fl. Brit. W. Ind. 567 (1864).

CHIHUAHUA: Rocky hills near Chihuahua, wet ledges, 1885, *Pringle 512*.

Arizona south through Mexico into South America. Pringle's collection no. 512 is cited as *C. tetragonus* var. *Pringlei* by Kükenthal, Pflanzenr. 101 (IV. 20): 493 (1936). The above cited specimen, in the Gray Herbarium, seems identical with *C. Mutisii* (at least as to Mexican specimens) and is very different from *C. tetragonus*. Perhaps Pringle's number is a mixture. Horvat, Cathol. Univ. Amer. Biol. Series 33: 78 (1941), refers the New York Botanical Garden specimen of *Pringle 512* to *C. Pringlei* Britt. but explicitly excludes the Philadelphia Academy specimen bearing the same number.

Cyperus (*Mariscus*) **inflexus** Muhl. Descr. Gram. 16: 1817.

COAHUILA: Sierra del Carmen, Cañon Sentenela, Wynd & Mueller 516; mountains 21 mi. northeast of Monclova, Sept. 1880, *Palmer 1330*. CHIHUAHUA: Pirámide, base of large rock-masses, Johnston 8123; Sierra Encinillas, 4 km. north of Fierro, damp sand arroyo, fairly common, Stewart 783; rocky flat just east of Organos, wet soil among grass, Stewart & Johnston 2060.

Widely distributed in temperate and tropical America.

Cyperus (*Mariscus*) **uniflorus** Torr. & Hook. Ann. Lyc. N. Y. 3: 431 (1836).

COAHUILA: Don Martin Dam, White 1390. CHIHUAHUA: Sandhills south of Samalayuca, Sept. 23, 1886, *Pringle 808*; sand dunes, Samalayuca, 1935, *LeSueur 1723*.

Ranging from Arizona to Arkansas south into northern Mexico.

Cyperus (*Torulinium*) **ferax** L. C. Rich. Act. Soc. Hist. Nat. Paris 1: 106 (1792).

COAHUILA: Don Martin Dam, White 1378; Sierra del Carmen, Sept. 5, 1936, *Marsh 809*; Muzquiz Swamp, 1936, *Marsh 933*; valley below Saltillo, abundant, 3 ft. tall, *Gregg 539*; Rancho La Botica, Valle de las Delicias, by water, Stewart 2853, 2926. CHIHUAHUA: By stream near Chihuahua, Oct. 30, 1885, *Pringle 588*.

Widely distributed in temperate and tropical parts of the world.

Scirpus acutus Muhl. ex Bigelow, Fl. Boston. 15 (1814); Beetle, Am. Jour. Bot. 28: 693 (1941).

Scirpus lacustris var. *occidentalis* Wats. Bot. Calif. 2: 218 (1880).

VERNACULAR NAME: Tule.

COAHUILA: Saltillo, rare in this locality, 1898, *Palmer 258*. CHIHUAHUA: Rio Conchos at Meoqui, *LeSueur 1099*; 3 mi. west of Camargo, White 2262.

The collection from Saltillo is immature and its identification is questionable. The collection from Meoqui is young but recognizable. White's material from Camargo is in prime condition. The achenes are 2.5 mm. long, the yellowish scales are smooth except for the whitened-scabrous midrib and mucro and the strongly fringed margin. The collection, which closely resembles the pale specimens characteristic of the southwestern United States, consists of two plants, one with lance-ovate spikelets (10×4 mm.), the other with elongate spikelets (up to 14×2.5 mm.). There does not seem to be any clear-cut difference between *S. acutus* and *S. validus*, either in character of the root-stocks and root, or in the shape, size, or microscopic details of the achenes.

Scirpus Olneyi Gray, Boston Jour. Nat. Hist. 5: 238 (1845).

COAHUILA: Sierra del Carmen, Aug. 9, 1936, *Marsh 744*; Monclova, *Marsh 1695*; Cuatro Ciénegas, *Marsh 2076*. CHIHUAHUA: Lake Santa Maria, *Nelson 6419*.

Widely distributed in United States and extending south into tropical America. The species differs from *S. americanus* in its very short involucre bract, usually blunter spikelet, much smaller style-branches, and more slender anthers.

Scirpus lineatus Michx. Fl. Bor. Am. 1: 32 (1803).

COAHUILA: Sierra del Carmen, Cañon Sentenela, stream-side, Wynd & Mueller 545.

An abundant species of eastern United States, extending southwest to Texas. Apparently not previously reported from Coahuila.

Scirpus coahuilensis Svenson, sp. nov.

Rhizomate duro adscendente ad apicem in fasciculis grandis caespitosis terminato; fasciculis 3–20-foliatis, prominenter usque ad 8 cm. chartaceo-vaginat; foliis firmis, glaucis, elongatis, 3–4 dm. longis, perangustis 0.5 mm. latis, planis vel concavis, margine serratis, ad apicem flexuoso-filiformibus; culmis strictis, basi foliatis, glaucis, filiformibus, 4–5 dm. altis, singulatim e fasciculis productis; foliis involucri filiformibus 1–10 cm. longis inflorescentiam plerumque superantibus; spiculis 12–20 lanceolatis, 7–10 mm. longis, 10–12-floris, laxe coarctatis sessilibusque vel in radiis 1–3 cm. longis glomerulatis; squamis membranaceis, albido-flavescentibus, ovatis, 4 mm. longis, glabris, frequenter scabrido-mucronatis; achaeniis late obovatis, plano-convexis vel obscure trigonis, 1.8–2 mm. longis, 1.4 mm. latis, nitide brunneis, leviter papillois; setis 2–4, levibus, plerumque achenio multo brevioribus; stylo 3-fido, sub ramis 2 mm. longo, minute fimbriato ad apicem, basi haud incrassato; staminibus 3, antheris 1.5 mm. longis.

COAHUILA: High western ridge of Sierra de la Fragua, north of Puerto Colorado, abundant, coarse tufts 1–3 ft. tall, on rocky slopes with scrub oaks and *Pinus Pinceana*, Sept. 2, 1941, Johnston 8763 (TYPE, Gray Herb.).

The relationships of this curious plant are obscure. Its general appearance, at least in the herbarium, is that of a much-stiffened *Eriophorum* with somewhat branched immature inflorescence. However, the general texture of the spikelets and especially of the bristles is quite different from that found in *Eriophorum*. One might infer that it represented an unusual species of *Bulbostylis*, but the plant is perfectly glabrous, and, furthermore, has practically no swollen style-base. Though the achenes, in color and shape, are somewhat similar to those of *Fimbristylis spathacea*, the plant does not appear to be related to either the New World or the Old World species of *Fimbristylis*. When the plant was collected it was assumed to be a species of *Carex* of the general relationship of *C. praegracilis*, since its individual spikelets superficially resemble those of that species. The plant forms very coarse clumps becoming a decimeter or more thick at the base. Its extremely abundant stems and leaves are ascending or widely spreading or even lie along the ground and may cover an area nearly a meter broad. It is a xerophyte growing in well-drained rocky calcareous soil along a ridge clothed with scattered pines and oaks.

Eleocharis rostellata Torr. Fl. N. Y. 2: 347 (1843).

COAHUILA: Bank of stream in cienega, 7 km. south of Cuatro Cienegas, Harvey 1235.

Saline or alkaline marshes from Nova Scotia and British Columbia south into northern Mexico; also in South America.

Eleocharis interstincta (Vahl) R. & S. Syst. **2**: 149 (1817).

COAHUILA: Muzquiz Swamp, 1936, *Marsh* 932.

Ranging from Texas to Florida and throughout the New World tropics.

Eleocharis cellulosa Torr. Ann. Lyc. N. Y. **3**: 298 (1836).

COAHUILA: Muzquiz Swamp, 1936, *Marsh* 930; Monclova, along Rio Monclova, *White* 1770.

Ranging, chiefly in brackish and coastal waters, in southern United States, West Indies, and Yucatan. Not previously reported from northern Mexico.

Eleocharis caribaea (Rottb.) Blake, *Rhodora* **20**: 24 (1918).

VERNACULAR NAME: Tulillo.

COAHUILA: Sabinas River, Muzquiz, *Marsh* 403; Monclova, *White* 1722, 1749, 1763; Rancho Coyote, Valle Acatita, about spring, *Stewart* 2736.

Widely distributed in temperate and tropical regions.

Eleocharis montevidensis Kunth, Enum. **2**: 144 (1837).

Eleocharis arenicola Torr. in Engelm. & Gray, Boston Jour. Nat. Hist. **5**: 237 (1847).

COAHUILA: Sierra del Carmen, Sept. 8, 1936, *Marsh* 747; Santa Anna Canyon, *Marsh* 451; Monclova, *Marsh* 1700; Saltillo, along shallow creek, 1898, *Palmer* 255; Saltillo, *Arsène* 10628. CHIHUAHUA: Chihuahua, low wet bottoms, 1908, *Palmer* 30; southwest of Chihuahua, *LeSueur* 1098.

Ranging from South Carolina to California and south to central Mexico; also in Argentina and Uruguay.

Eleocharis Parishii Britton, N. Y. Micros. Soc. Journ. **5**: 110 (1889).

CHIHUAHUA: Lake Santa Maria, *Nelson* 6415; 3 mi. west of Camargo, *White* 2261.

Western United States south into northern Mexico.

Eleocharis macrostachya Britton in Small, Fl. S. E. U. S. 184, 1327 (1903).

VERNACULAR NAME: Tule.

COAHUILA: High mesa in the Sierra Encantada 6 km. northwest of Buena Vista, erect in water of arroyo, fairly common, *Stewart* 1423; along trail from southern extremity of Hillcoat Mesa to Buena Vista headquarters, July 27, 1938, *Marsh* 1505; large charco in valley southeast of El Almagre, abundant in wet soil and standing water, *Johnston & Muller* 1221. CHIHUAHUA: Jimenez, Rio Florido, edge of water, *White* 2102; 37 mi. north of Escalon, by small pond, *White* 2079.

Widely distributed in Western United States and south into Mexico.

Eleocharis montana (Willd.) R. & S. var. **nodulosa** (Roth) Svenson, comb. nov.

Scirpus nodulosus Roth, Nov. Pl. Sp. 29 (1821).

COAHUILA: Cañon Indio Felipe, Sierra Hechiceros, in water along creek, 1 m. tall, *Stewart* 143.

Florida to Arizona and southward in tropical America. Typical *E. montana* is based upon plants from the high mountains of Colombia with thickened non-septate culms. Plants from lower altitudes have the culms more or less distinctly septate and may be distinguished as the var. *nodulosa*.

Fimbristylis spadicea (L.) Vahl, var. **puberula** Chapm. Fl. S. U. S. 549 (1860).

Fimbristylis puberula (Michx.) Vahl, Enum. **2**: 289 (1806).

COAHUILA: Cuatro Cienegas, 1939, *Marsh* 2078.

Representing the phase of the species with puberulent scales that is common in the interior of the continent.

Fimbristylis annua (All.) R. & S. Syst. **2**: 95 (1817).

CHIHUAHUA: Valley northeast of Chihuahua, Sept. 16, 1885, *Pringle* 555.

A very widely distributed plant, abundant in all tropical and temperate parts of the world.

Bulbostylis capillaris (L.) C. B. Clarke in Hook. Fl. Brit. Ind. **6**: 652 (1893).

CHIHUAHUA: Pirámide, along sheltered crevices in large rock-masses on plain, *Johnston* 8145.

The first collection of the species seen from Mexico. The pale-stramineous mature achenes average 1 mm. long. The spikelets are a trifle larger (up to 7 mm. long) and more arcuate-umbellate than in specimens from the United States. Ranging from Maine to Minnesota south to Texas; also on the Pacific coast from Oregon southward.

Bulbostylis juncoides (Vahl) Kükenth. ex Osten, Ann. Mus. Nac. Montevideo II. **3**: 188 (1931).

CHIHUAHUA: Sierra de los Organos, 1937, *LeSueur* 1286; hills northeast of Chihuahua, Aug. 20, 1885, *Pringle* 529.

Ranging from Texas to Arizona and south into Mexico; also in South America. Our plants have the loose inflorescence characteristic of var. *ampleiceps* Kükenth.

Schoenus nigricans L. Sp. Pl. 64 (1753).

COAHUILA: Cuatro Cienegas, along irrigation ditch, *White* 1921; Cuatro Cienegas, *Marsh* 2074.

The material from Cuatro Cienegas has scales and bracts pale straw-colored rather than dark brown or black, as is usual in this species. *Schoenus nigricans* has a wide distribution in the Old World. It is known only from scattered stations in northern Mexico and southern parts of the United States.

Hemicarpha micrantha (Vahl) Pax in E. & P. Nat. Pflanzenfam. **22**: 105 (1887).

CHIHUAHUA: Hills northeast of Chihuahua, Oct. 7, 1885, *Pringle* 524.

Widely distributed in the United States and southward to South America.

Dichromena colorata (L.) Hitchc. Rep. Mo. Bot. Gard. **4**: 141 (1893).

COAHUILA: Sabinas River near Muzquiz, 1936, *Marsh* 400; Muzquiz, 1938, *Marsh* 1168.

An abundant species in tropical America.

Cladium jamaicense Crantz, Inst. **1**: 362 (1766).

COAHUILA: Santa Anna Canyon, 1936, *Marsh* 439; ponds at El Anteojo, 3 mi. west of Cuatro Cienegas, forming very coarse clumps in deep water with *Typha*, stems becoming 10–12 ft. tall, conspicuous, *Johnston* 8871.

The mature achene is 3 mm. long, dark-brown except for the acute yellowish tip, smooth and shiny, with a broad truncate base. The "saw-grass" of the tropical savannas.

Fuirena simplex Vahl, Ecol. Am. **2**: 8 (1798), Enum. **2**: 384 (1806).

Fuirena obtusiflora Vahl, Ecol. Am. **2**: 8 (1798).

Fuirena Schiedeana Kunth, Enum. **2**: 183 (1837).

Fuirena squarrosa var. *aristulata* Torr. Ann. Lyc. N. Y. **3**: 291 (1836).

COAHUILA: Muzquiz Swamp, 1936, *Marsh* 929; Hermanas, 1939, *Marsh* 1573;

Monclova, Aug. 1880, *Palmer 1336*; Monclova, *Marsh 1740*; El Anteojo, 3 mi. west of Cuatro Ciénegas, edge of brackish lake, *Johnston 7124*; Rancho La Botica, by water, common, *Stewart 2941*; Cañon del Agua Grande, west of Las Delicias, on gypsum by water, common, 11 dm. tall, *Stewart 2798*; Rancho del Coyote, eastern margin of Valle de Acatita, edge of spring, common, *Stewart 2734*; Cañon del Indio Felipe, Sierra Hechiceros, in water along creek, 8 dm. tall, *Stewart 144*.

The specimens show the great variability in stature and conformation of perigonal bristles inherent in many species of *Fuirena*. From the closely related *F. squarrosa*, characteristic of the eastern United States, *F. simplex* is readily separated by the glabrous (sometimes minutely puberulent) style. Its relative has the style densely hispid. The scales vary from hispid to nearly smooth and the outer row of bristles is frequently longer than the ovate-tipped inner group. In one collection (*Marsh 929*) the outer series of bristles is conspicuously swollen in the middle. *Fuirena simplex* and *F. obtusiflora* (and *Rynchospora glauca*) were collected by von Rohr in South America, at "Baia Chico" on the northeastern coast of Venezuela. *Fuirena Schiedeana* was obtained by Schiede at Vera Cruz in 1829.

Carex Schiedeana Kunze, Suppl. Riedg. 119. t. 30 (1842); Mack. No. Am. Fl. **18**: 225 (1935), No. Am. Carices t. 261 (1940).

COAHUILA: Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh 1447*; Puerto San Lazaro, scattered on fine soil in shelter of shrubs on rocky slope, *Muller 3062*; Carneros Pass, hillsides, 1890, *Pringle 3218*; 4 km. east of Fraile, on mountain, *Stanford et al. 356*; Sierra del Pino, La Noria, on shale in deep shaded arroyo, *Johnston & Muller 494*; Sierra del Pino, La Noria, under shrubs on arroyo-bank, *Johnston & Muller 502*; Sierra del Pino, La Noria, shelter of oaks on flat, *Johnston & Muller 459*; west base of Picacho del Fuste, on north-facing mountain-side, base of *Yucca* on gypsum beds, *Johnston 8400*; west base of Picacho del Fuste, base of *Yucca* on Red Beds, *Johnston 8449*; tableland north of Cañon del Cuervo Chico, grassy rocky slope of low rounded limestone hill, *Johnston 8557*; Sierra Madera, Cañon Charretera, opening in oak thickets on rocky flats, *Johnston 9059, 9144*; high western ridge of Sierra Fragua, north of Puerto Colorado, under pines on east slope, one plant, *Johnston 8770*; Sierra Cruces, 7 mi. north of Santa Elena, dry limestone hillside, about the base of *Yucca* and *Dasyllirion*, *Johnston & Muller 316*; Sierra Mojada, Cañon San Salvador, sparse in moist shaded upper canyon, *Muller 3305*. CHIHUAHUA: Sierra Almagre, sparse on open slope with brush and some grass, *Johnston & Muller 1190*; Sierra Almagre, moist base of cliff in shaded deep canyon, *Johnston & Muller 1194*.

Ranging from western Texas south to central Mexico.

Carex praegracilis W. Boott, Bot. Gaz. **9**: 87 (1884); Mack. No. Am. Fl. **18**: 35 (1931).

CHIHUAHUA: Chihuahua, forming large patches in low wet bottom land, 1908, *Palmer 31*.

Widely distributed in the western United States.

Carex potosina Hemsl. Biol. Centr. Am. Bot. **3**: 474 (1885).

COAHUILA: 10 mi. east of Fraile, low place on silty valley floor, *Johnston 7306*. ZACATECAS: Valley 15 km. west of Concepcion del Oro, *Stanford et al. 557*.

Known only from the states of Coahuila, Zacatecas, and San Luis Potosi.

Carex Frankii Kunth, Enum. Pl. **2**: 498 (1837).

COAHUILA: Sierra del Carmen, Cañon Sentenela, moist stream-side, *Wynd & Mueller 550*.

Widely distributed in United States and extending south to Texas. Not

previously reported from Mexico. The achenes are 2×1.5 mm. in dimensions, somewhat larger than those given by Mackenzie for the species.

Carex hystricina Muhl. ex Willd. Sp. Pl. 4: 282 (1805).

COAHUILA: Sierra del Carmen, Cañon Sentenela, moist stream-side, Wynd & Mueller 549.

Widely distributed in United States. Not previously reported from Mexico. The perigynia are 7 mm. long, very firm, and of a glistening stramineous color. In these respects the collection is much like those seen from the southern United States. The perigynia thus reach the maximum size recorded by Mackenzie. The achenes are also a trifle larger than the common specimens from the northern United States.

Carex Emoryi Dewey, Torr. Bot. Mex. Bound. Surv. 230 (1859).

COAHUILA: Muzquiz, 1936, Marsh 1081.

Not previously reported from Mexico. The original collection was made on the Upper Rio Grande.

Carex filifolia Nutt. Gen. 2: 204 (1818).

COAHUILA: 11 km. northeast of Jimulco, rolling hills, Stanford et al. 35.

This collection appears to represent *C. filifolia*, a species widely distributed in the western United States but heretofore unreported from Mexico. Perhaps an undescribed species may be represented. The perigynia, though very young, show a beaked oblique apex. From other herbarium specimens examined the Mexican collection differs in its elongate, many-flowered staminate inflorescence. This exceeds 2 cm. in length but falls within the measurements for the part given by Mackenzie.

PALMAE

Brahea bella Bailey, Gentes Herb. 6: 194. f. 99, 100 (1943).

COAHUILA: Muzquiz, Dec. 5, 1936, Marsh 1061; Sierra Gloria, 1939, Marsh 1925, 2210.

The type of *B. bella* was collected by Prof. L. H. Bailey "on Rancho San Geronimo (Mangum) about fifty miles northwest from the postoffice at Muzquiz near the upper waters of the Rio La Babia." Additional material was obtained further northward "at Rancho Agua Dulce (Persons)." He states that the palm grows "on plains and mountains at altitude of 2000-3000 feet, in clefts and seams of limerock and among separated boulders of it, growing as single trees in many sizes but often covering the valley floor as if in forests and abundant on cliffs and broken ranges at higher altitudes."

The collections I have cited above are fragmentary or juvenile and have been doubtfully identified as *B. bella* by Bailey. They suggest that the species ranges along the escarpment of the plateau in northern Coahuila and in the outlying sierras in middle-eastern portions of the state. Perhaps also belonging to the species are the palms observed about the high limestone cliffs in the Sierra Gavia at the north portal of Tres Rios Pass, about 70 km. south of Monclova.

The present species is most closely related to *B. Berlandieri* Bartlett,

known only from La Silla, the type station, La Mitra, and Cañon Huesteca, in the vicinity of Monterey. This species, which possibly may just enter Coahuila in the mountains between Monterey and Saltillo, is said to differ from *B. bella* in having the fronds, at least beneath, distinctly glaucous and blue-green, rather than bright green on both sides and somewhat glossy and shiny. Since many elements of the flora found on the mountains about Monterey range northwestward at least to the Sierra Gavia and Sierra Gloria, south and southeast of Monclova, it would not be surprising if the palms known from these latter ranges prove either referable to *B. Berlandieri* or intermediate between that species and *B. bella*.

LEMNACEAE

Lemna gibba L. Sp. Pl. 970 (1753).

CHIHUAHUA: Samalayuca, in springs, April 17, 1852, *Wright 1892*.

Nebraska to Texas and west to California; northern Mexico; Old World.

COMMELINACEAE

Tradescantia crassifolia Cav. Icones 1: 54. t. 75 (1791).

VERNACULAR NAME: Lino de Maiz.

COAHUILA: Sierra del Carmen, Cañon Sentenela, *Wynd & Mueller 566*; Sierra del Carmen, Sept. 12, 1936, *Marsh 816*; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh 1468*; Saltillo, July 16, 1848, *Gregg 253*; Carneros Pass area, 1880, *Palmer 2016*; highest peaks of the Sierra Cruces, rock crevices, fl. purple, *Stewart 1142*. CHIHUAHUA: Sierra Rica, Cañon Madera, crevices of cliffs, fl. purple, *Stewart 2491*; valley 4 km. south of Rancho Encinillas, clump of mesquites, fl. blue, *Stewart 722*; slopes about high valley at northwest end of Sierra Diablo, fl. purple, *Stewart 958*; Sierra Organos, *LeSueur*; El Pozo, Sierra Santa Eulalia, fl. lavender, *White 2416*; hills near Chihuahua, *Pringle 691, 1386*.

A variable but readily recognizable widely ranging species which reaches its northern limit in our area. The stems and lower leaf-surfaces are usually white-villous, but plants glabrescent in various degrees are frequent.

Tradescantia brachyphylla Greenm. Proc. Am. Acad. 33: 471 (1898).

COAHUILA: Mountains 4 km. east of Fraile, moist place, fl. purple, *Stanford et al. 357a*. ZACATECAS: Concepción del Oro, among thorny shrubs high up steep canyon-sides where moist and shady, fl. bright rose-color, rare, 1904, *Palmer 323*; 15 km. west of Concepcion del Oro, *Stanford et al. 554*.

Known from the Sierra Madre of Nuevo Leon and Tamaulipas and from Puebla.

Tradescantia Wrightii Rose & Bush, Trans. Acad. Sci. St. Louis 14: 188 (1904).

COAHUILA: Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh 1479*; western base of Picacho del Fuste, gypsum beds on north slope, corolla purple, *Johnston 8396*; mountains 4 km. east of Fraile, moist place, *Stanford et al. 360*; Cañon del Agua Chica, west of Las Delicias, limestone slope, fl. purple, *Stewart 2828*; ? Rancho del Coyote, east side of Valle Acatita, on gypsum in arroyo, fl. white, *Stewart 2746*. CHIHUAHUA: Northwest end of Sierra Diablo, open hillside, fl. lavender, *Stewart 978*.

A species known only from our area and from trans-Pecos Texas (mountains near El Paso, *Wright 701*, type; Guadalupe Mts.; and near Alpine). In our area it is readily recognized by its simple stem, 15–25 cm. tall, which bears a single cauline leaf and is terminated by a sessile cluster of flowers.

The Texan material is completely glabrous, but the Mexican specimens have glanduliferous hairs on the pedicels.

Tradescantia pinetorum Greene, *Erythea* 1: 247 (1893).

CHIHUAHUA: Cool slopes in the hills northwest of Chihuahua, *Pringle* 804.

A characteristic plant of the highlands of western Chihuahua and adjacent Sonora and Arizona. It is readily recognized by the very abundant minute retrorse hairs which usually clothe its slender stems.

Tradescantia Karwinskyana Schultes, *Syst. Veg.* 72: 1165 (1830).

COAHUILA: Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh* 1416; Sierra Gloria, *Marsh* 1893; Carneros Pass area, 1880, *Palmer* 1325; mountain 4 km. east of Fraile, moist place, fl. purple, *Stanford et al.* 357. ZACATECAS: 15 km. west of Concepcion del Oro, fl. purple, *Stanford et al.* 499.

Ranging from Hidalgo north along the eastern Sierra Madre into our area.

Tradescantia venustula Kunth, *Enum.* 4: 87 (1843).

VERNACULAR NAME: Lino de Maiz.

COAHUILA: Near Santo Domingo, limestone hill, *Wynd & Mueller* 458; Santa Anna Canyon, *Marsh* 485; Mesa Grande, 4 km. northwest of Hac. Encantada, *Stewart* 1670; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh* 1415, 1418; vicinity of Buena Vista Ranch headquarters, July 14, 1938, *Marsh* 2288; east of La Rosa, dry mountain slope, *Wynd & Mueller* 39; hills 20 mi. west of Saltillo, *Shreve & Tinkham* 9825; Saltillo, *Gregg* 250; Saltillo, 1898, *Palmer* 319; Sierra Madera, Cañon Charretera, *Johnston* 9119; Sierra del Pino, Cañon Ybarra, *Stewart* 1245, 1808; Sierra del Pino, La Noria, *Johnston & Muller* 408, 609; Sierra Cruces, Cañon Tinaja Blanca, *Johnston & Muller* 260a; Picacho de San José, *Stewart* 1113; Sierra Mojada, Cañon Hidalgo, below crest, *Stewart* 1097. CHIHUAHUA: Sierra Diablo, Cañon Rayo, *Stewart* 923; Sierra Diablo, high valley at northwestern end of sierra, *Stewart* 979.

An attractive plant with glabrous glaucescent stems and leaves and pale sky-blue corollas. It favors open rocky hillsides and, though widely distributed in northern Coahuila, is seldom common.

I refer the Coahuilan plant to *T. venustula* with some hesitation. That species was based upon plants grown at Berlin from seeds collected in Mexico by Karwinski. Plants indistinguishable from the Coahuilan plants have been collected by Purpus (no. 5019) near Minas de San Rafael, S.L.P., and accordingly the species can be expected in northern Hidalgo where Karwinski made extensive collections. Kunth's description of *T. venustula*, except for the flower-color ("sepala . . . interiora in alabastro azurea"), fits equally well either the present plant or the one I have called *T. rhodantha*. The present species, however, has decidedly sky-blue petals, which show this color even in the bud and accordingly differ markedly from the reddish petals of *T. rhodantha*.

Tradescantia rhodantha Torr. *Bot. Mex. Bound.* 225 (1859).

COAHUILA: Sierra del Carmen, Cañon Sentenela, *Wynd & Mueller* 618; Sierra del Carmen, Sept. 7, 1936, *Marsh* 805. CHIHUAHUA: Sierra Rica, Cañon Madera, cliff crevices, fl. purple, *Stewart* 2515; rocky hills just west of Chihuahua, *Pringle* 698.

This species has reddish or reddish pink flowers and usually glandular hairy pedicels and calyces. It is best known from western Chihuahua and from thence ranges southward at scattered stations to Durango, San Luis

Potosi, and Guerrero. Our plants clearly belong to *T. rhodantha* Torr.; that species, however, may have an earlier name in *T. linearis* Benth.

Commelina diffusa Burm. f. Fl. Ind. 18. t. 7 (1768).

COAHUILA: Carneros Pass area, July 1880, *Palmer* 1326.

An Asiatic species introduced and now widely established in America.

Commelina dianthifolia Delile in Redout. Liliac. 7. t. 390 (1801).

COAHUILA: Sierra del Carmen, Sept. 7, 1936, *Marsh* 796; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh* 2273. CHIHUAHUA: Sierra Rica, Cañon Madera, sunny slopes, *Stewart* 2536.

Widely distributed in Mexico and extending northward along the western Sierra Madre to Arizona, New Mexico, and trans-Pecos Texas.

Commelina erecta L. Sp. Pl. 41 (1753).

VERNACULAR NAME: Espuelitas.

COAHUILA: Allende, *Marsh* 2228; 11 mi. south of Allende, *Johnston* 7011; Yerda Spring, *Marsh* 354, 357, 951; Muzquiz — La Mariposa, *Marsh* 374; 25 mi. southwest of Sabinas, *Wynd & Mueller* 208; Sierra del Carmen, 10 km. northeast of Hac. Encantada, *Stewart* 1560; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh* 1477, 1478; Cañon San Enrique, Sierra Encantada, west of Buena Vista, *Stewart* 1365; Cañon Bocatoche, *Muller* 3105; hills near Mesillas, *Gregg* 526; Sierra del Pino, La Noria, *Johnston & Muller* 619; 12 mi. north of San Rafael, *Stewart* 423; Sierra Cruces, near Santa Elena, *Stewart, Johnston & Muller* 246, *Stewart* 604; Sierra Cruces, Cañon Tinaia Blanca, *Johnston & Muller* 260; northwest end of Sierra Planchada, *Stewart* 1007; east of Guimbalet, *Stewart* 2637; Tanque Toribio, 30–40 km. north of Colonias, *Stewart* 2781. CHIHUAHUA: 5 km. south of Rancho Encinillas, *Stewart* 714; Cañon Coyote, 20 km. northwest of Santa Fe, *Stewart* 2608; near Trinidad, *Stewart* 2584; near Chihuahua, *Pringle* 531; El Pozo, Sierra Santa Eulalia, *White* 2417; Meoqui, *LeSueur* 487; 12 mi. south of Camargo, *White* 2195; 5 mi. east of Jimenez, *White* 2129.

A plant frequent on flats and on hillsides, in clay or rocky places, commonly sheltered by bushes or cacti and more or less supported by them. A northern species which reaches south into Chihuahua, Coahuila, and Nuevo Leon. The common form in our area is the narrow-leaved var. *angustifolia* (Michx.) Fernald, *Rhodora* 42: 439 (1940). Mr. Marsh has collected about Muzquiz, however, a form with broader, thinner, darker green leaves which appears to be referable to typical *C. erecta* L.

Setcreasea brevifolia (Torr.) Pilger in E. & P. Nat. Pflanzenfam. Ergänzungsheft 2: 42 (1906).

VERNACULAR NAME: Pollo.

COAHUILA: Sierra del Carmen, Cañon Sentenela, *Wynd & Mueller* 624; Rancho Agua Dulce, Sierra San Manuel, *Wynd & Mueller* 335; Palm Canyon, Muzquiz, *Marsh* 356; Sierra Guajes, Cañon Milagro, shaded canyon-sides, *Stewart* 1534a; Sierra Encantada, high mesa 15 km. northwest of Buena Vista, rocky slopes, fl. orchid, *Stewart* 1438; Sierra Gloria, *Marsh* 2220; Soledad, fl. pink, 1880, *Palmer* 2014; Cuatro Cienegas, *Marsh* 2049; Sierra Hechiceros, Cañon Indio Felipe, cliff-face, fl. lavender, *Stewart* 3; Sierra del Pino, head of Cañon Ybarra, hillside, fl. light pink, *Stewart* 1257; western base of Picacho del Fuste, among loose rocks in deep arroyo, *Johnston* 8450; Picacho de San José, among rocks on open hillside, *Stewart* 1109.

Ranging from the Davis and Chisos Mountains and the lower Pecos River (type locality), in Texas, south into northern Coahuila. A low

plant with coarse rhizomes growing among loose rocks or in crevices, usually on sheltered cliffs or north-facing slopes. Usually locally common when present. The corollas are pinkish. In the literature this plant of desert mountains has been confused with *Setcreasea Buckleyi* nom. nov. (*Tradescantia speciosa* Buckley, Proc. Acad. Nat. Sci. Phila. 1862: 9 [1863], not Linn.), a plant of the coastal area of southern Texas which has a paler corolla and loosely branched elongate trailing stems.

Setcreasea leiandra (Torr.) Pilger almost certainly grows along our northern boundary. It is a trans-Pecos Texan plant known from such stations as the Davis Mts., Chinati Mts., and (at the type-locality in Paysano Pass) near Alpine.

Tinantia erecta (Jacq.) Schlecht. *Linnaea* 25: 185 (1852).

CHIHUAHUA: Near Chihuahua, *LeSueur* 248; shade of cliff in mountains southwest of Mapula station, *Pringle* 805.

A tropical species extending northward along the Sierra Madre into Chihuahua.

Commelinantia Pringlei (Wats.) Tharp, *Torreyia* 24: 52 (1924), Bull. Torr. Bot. Cl. 54: 337. t. 26, 27 (1927).

COAHUILA: Sierra del Carmen, Cañon Sentenela, moist stream-side, *Wynd & Mueller* 619; Yerda Spring, *Marsh* 950; Sierra Gloria, *Marsh* 1957; Sierra Guajes, Cañon Milagro, shaded places in deep canyon, *Stewart* 1534; Sierra Hechiceros, Cañon Indio Felipe, shaded crevices on cliffs and along stream, *Stewart* 4, 112.

A very distinct species known only from the mountains of Nuevo Leon and northern Coahuila.

PONTEDERIACEAE

Eichornia crassipes (Mart.) Solms in DC. Monogr. Phan. 4: 527 (1883).

COAHUILA: Monclova, 1939, *Marsh* 2201, 2243.

A floating aquatic from South America now widely established in the warmer parts of the world.

Heteranthera dubia (Jacq.) MacMill. Metasp. Minn. Valley 138 (1892).

CHIHUAHUA: Rio Conchos at Rosatilla, *LeSueur* 564; Rio Conchos at Camargo, *White* 2242.

A floating aquatic widely distributed in temperate and tropical America.

Heteranthera mexicana Wats. Proc. Am. Acad. 18: 166 (1883).

COAHUILA: Villa Juarez, on Sabinas River, 1880, *Palmer* 1324 (TYPE).

Known only from northeastern Coahuila and adjacent Texas.

Heteranthera limosa (Sw.) Willd. Ges. Nat. Freunde Berlin Neue Schr. 3: 439 (1801).

COAHUILA: Tanque La Palma, south base of Sierra Hechiceros, in wet mud and standing water, *Johnston & Muller* 1281. CHIHUAHUA: Sierra Hechiceros, near Rancho Encampanada, along stream, *Stewart* 193.

Widely distributed in temperate and tropical America.

BROMELIACEAE

Hechtia texensis Wats. Proc. Am. Acad. 20: 374 (1885).

Hechtia scariosa L. B. Smith, Contr. Gray Herb. 117: 20 (1937).

VERNACULAR NAMES: Guapilla; Aguapie.

COAHUILA: Hermanas, *Marsh 1608*; Sierra San Vicente, Cañon Espantosa, *Schroeder 146*; La Pistola, eastern margin of Llano de Guaje, arid limestone hills, *Johnston & Muller 770*; Sierra del Pino, ledges at mouth of southern canyon, *Johnston & Muller 733*; Tanque Jerico, limestone hillside, *Johnston 8337*; western base of Picacho del Fuste, cemented gravels, *Johnston 8447*; Potrero del Cuervo Chico near Tanque Bandido, limestone ledges, *Johnston 8578*; Aguaje Pajarito, west end of Sierra Fragua, rocky slopes and ledges, *Johnston 8716*; Parras, March 1905, *Purpus 1101*; eastern foothills of Sierra Cruces north of Santa Elena, limestone ledges, *Johnston & Muller 324*; Sierra Jimulco, 11 km. northeast of Jimulco, *Stanford et al. 88*; near Jimulco, limestone ledges, *Pringle 72* (type of *H. scariosa*). CHIHUAHUA: Sierra San Carlos, lime-shale ridge near mines, *Johnston & Muller 62*.

The type-locality of this species was given by its discoverer (Havard, Proc. U. S. Nat. Mus. **8**: 478. 1885) as follows: "On the bluffs of the Rio Grande, south of the Chisos Mountains, mixed with Lechuguilla and nearly as forbidding, was collected a new species of a genus not before observed in the United States — *Hechtia texensis*, Watson." Subsequently the plant has been found in various parts of the Big Bend area, apparently always on limestones. The plant is common and widely distributed on sunny limestone ledges and on banks of cemented gravels over most of Coahuila, usually in the company of *Agave lechuguilla* and frequently of *Agave falcata*. The heads of armed leaves grow in crowded clumps. In some old colonies the clumps die out at the center and the heads become arranged in a ring up to a meter or more in diameter. Although the margins of the leaves have very sharp recurved thorns, the tissue of the blade is very juicy and can be chewed for quenching thirst when no other source of water is available.

The species is characterized by its scarious, usually pinkish sepals and bracts, and by its loosely branched inflorescence. It is probably most closely related to *H. elliptica*, of southeastern Coahuila and northern Zacatecas, which differs in its subsimple female inflorescence and firmer stramineous sepals and bracts.

Hechtia elliptica L. B. Smith, Contr. Gray Herb. **117**: 20 (1937).

Hechtia zacatecae L. B. Smith, Contr. Gray Herb. **117**: 21 (1937).

COAHUILA: Saltillo, June 1898, *Palmer 205* (TYPE). ZACATECAS: Cedros, high ridges, *Kirkwood 5* (type of *H. zacatecae*); without locality, 1908, *Lloyd 125*.

This species probably ranges widely along the western base of the Sierra Madre and on the small ranges of the plateau, in southeastern Coahuila, western Nuevo Leon, and northern Zacatecas. It is closely related to the more easterly *H. glomerata* Zucc. and appears to replace that species on the plateau. *Hechtia glomerata*, which has a synonym in *H. Ghiesbreghtii* Lehm. (and probably others in *H. capituligera* Mez, *H. gamapetala* Mez, and *H. mexicana* Smith), ranges from Zapala County, Texas, south in Tamaulipas and Nuevo Leon to Hidalgo. It differs from *H. elliptica* in having smaller capsules and smaller firmer brownish sepals and floral bracts scantily clothed with trichomes. Like *H. elliptica*, and hence differing from *H. texensis*, its female inflorescence consists of a spicate arrangement of dense capitate glomerules. *Hechtia glomerata* may possibly enter our borders in northeastern Coahuila.

Tillandsia recurvata L. Sp. Pl. ed. 2. 410 (1862).

COAHUILA: Sierra del Carmen, Cañon Sentenela, Wynd & Mueller 589; Yerda Springs, Marsh 323; Sierra Gloria, Marsh 2007; Puerto San Lazaro, Wynd & Mueller 119, Muller 3101; San Lorenzo Canyon, 6 mi. southeast of Saltillo, shady rock-face, 1904, Palmer 428; Sierra Cruces, Cañon Tinaja Blanca, local, Johnston & Muller 262; Sierra Cruces, Cañon Encinal, local, Stewart 2276; Sierra Jimulco, 11 km. northeast of Jimulco, Stanford et al. 6. CHIHUAHUA: Sierra Almagre, local in deep canyon, Johnston & Muller 1184. ZACATECAS: Higher canyons, Santa Rosa and Cedros, Kirkwood 42; without locality, 1908, Lloyd 55.

An epiphyte growing on rocks, cliffs, and trees in canyons and sheltered places. Commonly occurring in great abundance when present, but colonies usually very localized and very widely scattered, and in some areas uncommon or even rare.

JUNCACEAE

by F. J. HERMANN

Juncus mexicanus Willd. in R. & S. Syst. Veg. 7: 178 (1829).

COAHUILA: Saltillo, large masses in wet bottoms, 1898, Palmer 201. CHIHUAHUA: 3 mi. west of Camargo, White 2278.

Texas to California and south in Mexico; Chile and Patagonia.

Juncus bufonius L. Sp. Pl. 328 (1753).

COAHUILA: Saltillo, in a ditch, 1898, Palmer 263.

Nearly throughout North America; cosmopolitan.

Juncus tenuis Willd. Sp. Pl. 2: 214 (1799).

Juncus dichotomus Ell. Bot. S. Carolina 406 (1821).

Juncus albicans Fernald, Proc. Am. Acad. 45: 415 (1910).

COAHUILA: Sierra del Carmen, Sept. 8, 1936, Marsh 750. CHIHUAHUA: Outskirts of Chihuahua, a few plants in corn-field, 1908, Palmer 161 (type of *J. albicans*).

Typical *J. tenuis* is found from Massachusetts and Florida to Texas and Mexico; also in South America from Brazil to Argentina. The type of *J. albicans* is a form intermediate between typical *J. tenuis* and the var. *multicornis* (i.e. *J. macer* S. F. Gray). Such transitional forms are comparatively infrequent in the eastern United States but become more plentiful in the southwest. The auricles in *J. albicans* are intermediate in texture between those of typical *J. tenuis* and the var. *Dudleyi*; the seeds are nearer those of the var. *multicornis* (the shallowly margined areolae averaging four times as broad as long, and about 40 to a vertical row) than to those of true *J. tenuis* (the conspicuously ridged areolae averaging only twice as broad as long, and less than 20 to a vertical row) and are not appreciably longer nor more prominently white-caudate than the average in either typical *J. tenuis* or its var. *multicornis*.

Juncus tenuis var. **Dudleyi** (Wiegand) Hermann, comb. nov.

Juncus Dudleyi Wiegand, Bull. Torr. Bot. Cl. 27: 524 (1900).

COAHUILA: Sierra del Carmen, Cañon Sentenela, 1936, Wynd & Mueller 561.

The cited collection is slightly atypical but may be referred to this variety, which ranges from Newfoundland to Washington and south through central and western United States into Mexico. Although *J. tenuis*, as it occurs in its typical form on the coastal plain of the eastern United States,

is readily distinguishable from allied forms, the characters setting it off from those currently separated as *J. Dudleyi* tend to become obscure to imperceptible where the ranges of the two plants merge. This is doubtless the explanation of many of the recurrent reports of "*J. tenuis*" from stations far inland. Specimens from the upper Mississippi Valley, in particular, may frequently have as much in common with *J. tenuis* as they do with *J. Dudleyi*; examples of such intermediates from Indiana are *Deam 54009*, White County; *Kriebel 3451*, Lawrence County; and *Friesner 6038*, Hancock County. Such transitional forms appear sporadically in the east (*Hermann 4344*, Delaware County, Pa., having some auricles almost those of typical *Dudleyi*, some of *tenuis*, and some approaching those of *macer*, and leaf-blades from flat to involute to terete), but become progressively more common westward.

Juncus tenuis* var. *multicornis E. Mey. *Linnaea* **3**: 371 (1828).

Juncus macer S. F. Gray, *Nat. Arr. Brit. Fl.* **2**: 164 (1821).

Juncus tenuis of authors, not Willd.

COAHUILA: Sierra Hechiceros, Cañon Indio Felipe, edge of creek, *Stewart 111*; Sierra del Pino, La Noria, moist sand in arroyo, *Johnston & Muller 481*, *Stewart 1202*.

Ranging almost throughout North America; also in Chile, Argentina, and Brazil. Among the collections cited, *Stewart 1202* is a transitional form approaching typical *J. tenuis*.

Recent study of an extensive series of southwestern collections in §*Poiophylli* shows that the disintegration of the specific line between *J. tenuis* and *J. macer* is as pronounced as that between *J. tenuis* and *J. Dudleyi*. Again illustrations of this may be found in the eastern United States, such as *Nils 8*, from the mouth of the Patuxent River, Md., having some auricles of *tenuis* and some of *macer* and most of the mature seeds those of *macer*, and *True 313*, from Chester County, Pa., having auricles intermediate between *tenuis* and *macer*. The much more numerous intermediates in the western United States appear in various forms. Infrequently one may show the prolonged, scarious auricles of *macer* in combination with the dark olive to brownish green inflorescence and mahogany-brown capsules of *tenuis* (*Demaree 14946*, Drew County, Ark.); but much more common are forms having the inflorescence and capsules of *macer* but the auricles imperceptibly, if at all, prolonged and the sheaths strongly tinted with red at the base. Such transitional forms seem to be the basis of the anomalous *J. dichotomus* var. *platyphyllus* Wiegand, *Bull. Torr. Bot. Cl.* **30**: 448 (1903).

The unreliability of the characters employed to maintain these plants as specifically distinct from one another becomes patent upon study of a comprehensive series of collections representing the full extent of their known geographic ranges. Thus the leaf-blades in a large proportion of the collections of typical *J. Dudleyi* are terete, either altogether (*Howell 12775*, Trinity County, Calif.) or in part (*Hermann 7944*, Keweenaw County, Mich.), whereas the leaf-blades of "typical" *tenuis* may be absolutely terete throughout, or flat at the base to terete towards the apex, or

convolute, or involute, several types being frequently found on a single plant. Likewise the ridges marking off the areolae on the seeds in *J. tenuis*, although very pronounced up to the time of full maturity, tend to become eventually almost as inconspicuous as those in the seeds of *J. macer*; and the differences between the two in relative width and length of the areolae are equally unstable.

For the reasons given, it has seemed desirable to regard both *J. Dudleyi* and *J. macer* as varieties of *J. tenuis*. It is unfortunate that, according to the rules of nomenclature, Meyer's *J. tenuis* var. *multicornis* must be taken up as the proper name for so widespread and common a plant as *J. macer*. Originally applied to a minor ecological or physiological form, it was poorly chosen for the form Meyer had in hand, and it becomes entirely meaningless as an epithet for the broader application in which it must now be used.

Juncus nodosus L. var. **meridianus** Hermann, var. nov.

Planta a varietate typica recedit fructus rostro brevior, 0.5–0.75 mm. longo, valvulis apice non cohaerentibus.

COAHUILA: Saltillo, 1898, *Palmer* 264 (US). CHIHUAHUA: Ojo Almagre, Sierra Almagre, wet sand in canyon, locally abundant, tuberous, *Johnston & Muller* 1203; Chihuahua, a few plants in large bunches in moist shady place under overhanging rocks of river bank, 1908, *Palmer* 360 (TYPE, U. S. Nat. Herb.); 3 mi. west of Camargo, *White* 2268; Jimenez, wet sandy soil along Rio Florido, *White* 2088; El Cima, June 29, 1936, *LeSueur* 1112. TEXAS: Glenn Springs, Chisos Mts., *Warnock* 770 (US); Lower Oak Canyon, Chisos Mts., *Sperry* 329 (US); Gano Springs, west of Chisos Mts., *Sperry* 401 (US).

Known only from Coahuila, Chihuahua, and the Chisos area in Texas. In typical *J. nodosus*, which ranges across the northern United States and south to Virginia, Illinois, New Mexico, and southern Nevada, the narrowly oblong capsules generally equal the perianth in length, only the long beak, 0.75–1.5 mm. long, being exserted. In the var. *meridianus* the broadly oblong capsules conspicuously exceed the perianth, the short, abrupt beak, 0.5–0.75 mm. long, having its base raised about 1 mm. above the tips of the perianth-segments. The capsule-valves in the var. *meridianus* are less firm in texture than those of typical *nodosus*, are usually pale stramineous in color rather than dark brown, and apparently separate completely immediately upon dehiscence instead of cohering at the apex. The stamens are very frequently reduced to three in the variety, and the rhizomes tend to be more generally and prominently tuberiferous.

Juncus Torreyi Coville, Bull. Torr. Bot. Cl. **22**: 303 (1895).

COAHUILA: Sierra del Carmen, Aug. 9, 1936, *Marsh* 647, 745; Monclova, *Marsh* 1648.

Widely distributed in the United States and south into Coahuila.

Juncus saximontanus Nels. Bull. Torr. Bot. Cl. **29**: 401 (1902).

COAHUILA: Sierra del Carmen, Cañon Sentenela, *Wynd & Mueller* 509; Sierra Hechiceros, Cañon Indio Felipe, water along creek, *Stewart* 145.

Colorado to British Columbia, south to Oregon, Arizona, and New Mexico; extending south in Mexico to Durango and east into northern Coahuila. Of the two collections cited, that from the Sierra del Carmen

belongs to the forma *brunnescens* (Rydb.) Hermann, differing from the typical form in having relatively smaller, more numerous, and fewer-flowered heads in the inflorescence.

LILIACEAE

Smilax bona-nox L. Sp. Pl. 1030 (1753).

COAHUILA: Yerda Spring, near Muzquiz, *Marsh* 266; Sierra Gloria, *Marsh* 1995.

A plant of eastern Mexico and eastern United States. Entering our area from adjoining Nuevo Leon.

Asphodelus fistulosus L. Sp. Pl. 309 (1753).

Glyphosperma Palmeri Wats. Proc. Am. Acad. **18**: 164 (1883).

COAHUILA: Saltillo, sandy valleys, 1880, *Palmer* 1320 (type of *G. Palmeri*); Saltillo, in roadside ditch, juncoïd, dense clumps 1–2½ ft. tall, flowers pinkish, *Johnston* 7246. ZACATECAS: Near Concepcion del Oro, 1902, *Palmer* 385.

Introduced from southern Europe and widely established in central Mexico.

Anthericum Torreyi Baker, Jour. Linn. Soc. **15**: 317 (1876).

COAHUILA: Hillcoat Canyon west of Buena Vista Ranch, July 13, 1938, *Marsh* 2285; Valle de los Guajes, 25 km. south of Buena Vista, grassy flat, not common, erect, fl. orange, *Stewart* 1327; basal slope of low limestone hill on plateau north of Cañon de Cuervo Chico, gravelly places, erect, fl. orange, *Johnston* 8566; limestone hills near La Rosa, *Shreve & Tinkham* 9574. CHIHUAHUA: 16 km. south of Escobillas, silty flat, frequent, erect, fl. yellowish, *Stewart* 2362; Chihuahua, *LeSueur* 471, *Pringle* 666; 11 mi. northeast of Camargo, silty soil along draw, one plant, fl. orange, *Johnston* 7922; high valley at northwestern end of Sierra Diablo, open hillside and grassy meadows, not common, erect, fl. orange, *Stewart* 971. ZACATECAS: 18 km. west of Concepcion del Oro, on mountain, 18 in. tall, fl. yellow, *Stanford et al.* 600.

The plants referred here have fruits less than 12 mm. (commonly not surpassing 10 mm.) long. The leaves in *Stanford et al.* 600 and *Johnston* 7922 are 4–6 mm. wide and flat, but the other collections have them conspicuously narrower, usually revolute, and with veins more prominent and crowded. This latter form is typical *A. Torreyi* and is found in western Chihuahua, New Mexico, and western Texas. The material from Arizona and adjacent Mexico, passing as *A. Torreyi*, differs in having the filaments nearly smooth and not conspicuously vesicular-roughened as in typical *A. Torreyi*.

Anthericum stenocarpum Baker, Jour. Linn. Soc. **15**: 317 (1876).

COAHUILA: Sierra del Pino, head of Cañon Ybarra, dry hillside, *Stewart* 1259a; Sierra del Pino, saddle north of high eastern ridge, frequent, crevices, open slopes, fl. orange, *Stewart* 2283; Sierra del Pino, near La Noria, meadows and on terrace along arroyo, *Johnston & Muller* 482, *Stewart* 1220; escarpment on west side of Potrero de la Mula, rocky places under oaks, fl. yellow, *Johnston* 9231; crest of escarpment west of Potrero de la Mula, moist gravelly places along seepage, *Johnston* 9253; Sierra Gloria, *Marsh* 2217; mountain valley 26 km. northwest of Fraile, 18 in. tall, fl. yellow, *Stanford et al.* 423; San Antonio de las Alanzanas, yellow, 2 ft. tall, frequent, *Gregg* 393 (ISOTYPE).

A plant of the oak and pine belts characterized by its coarse habit, large strict capsules (13–20 mm. long), and broad flat leaves. It is also known from the Sierra Madre of Nuevo Leon and Tamaulipas. Watson, Proc. Am.

Acad. **18**: 164 (1883), reports the species from Lirios, Coahuila (*Palmer 2012*).

Anthericum leptophyllum (Benth.) Baker, Jour. Linn. Soc. **15**: 317 (1876).

COAHUILA: Near Saltillo, Sept. 1898, *Palmer 327*.

The above collection may be only a phase of *A. Torreya*, but it very much resembles the type collection of *A. lepidophyllum*, from Aguas Calientes. This latter species is close to the more northern *A. Torreya*, differing in its shorter, somewhat firmer, scabridulous leaves, which at anthesis seem to be less well developed than in *A. Torreya*.

Hemiphylacus latifolius Wats. Proc. Am. Acad. **18**: 164 (1883).

COAHUILA: Mountains 6 mi. east of Saltillo, 1880, *Palmer 1319* (TYPE); Chojo Grande, 27 mi. southeast of Saltillo, gravelly openings in canyon, leaves quite fleshy, Aug. 1904, *Palmer 367*; rolling hills 11 km. northeast of Jimulco, fl. white, tubers 1–2½ in. long, *Stanford et al. 79*.

Known also from San Luis Potosi and Oaxaca. A very coarse broad-leaved herb with unusual sausage-shaped tubers.

Zigadenus virescens (H.B.K.) Macbr. Contr. Gray Herb. **53**: 4 (1918).

COAHUILA: Carneros Pass area, 1880, *Palmer 1321*; Carneros Pass, *Pringle 2827*; ? Hillcoat Mesa west of Encantada Ranch, July 25, 1938, *Marsh 1473*.

Widely distributed in the mountains of Mexico.

Schoenocaulon Coulteri Baker, Jour. Linn. Soc. **17**: 477 (1879).

Schoenocaulon intermedium Baker, Jour. Linn. Soc. **17**: 477 (1879), as to *Coulter 1568*.

Schoenocaulon macrocarpum Brinker, Ann. Mo. Bot. Gard. **29**: 300 (1942).

COAHUILA: Mountain-border near Saltillo, frequent, 2 ft. tall, root used for snuff, June 25, 1848, *Gregg 214*; high western end of Sierra Fragua north of Puerto Colorado, rocky soil under pines on east slopes, frequent, 12–30 in. tall, corolla yellowish green, *Johnston 8754*; Sierra del Pino, dry rocky slope at lower edge of pine-oak belt below La Noria, local, *Johnston & Muller 421*; Sierra Mojada, Cañon Hidalgo, about cliffs in shady canyon below the crest, not common, erect, fl. white, *Stewart 1070*. CHIHUAHUA: Sierra Santa Eulalia, 1885, *Pringle 40*; 14 km. up Cañon Rayo, north-east end of Sierra Diablo, shade of bushes on arroyo bank, not common, fl. white, *Stewart 925*.

Ranging in our area and in the mountains of eastern Mexico south at least to Hidalgo (type from Zimapan); apparently also in the Guadalupe Mts. of western Texas and adjoining southeastern New Mexico. The species much resembles and is closely related to *S. Drummondii* and especially *S. texanum* of Texas, differing from them in its more southern range and extremely fibrous bulb-coats. The bulbs of the Texan plants have friable papery coats and are persistently fibrous only at the neck where they project from the soil. The usually more elongate and deeply buried bulbs of *S. Coulteri* have extremely fibrous coats. The outer coats disintegrate in age and the older bulbs become thickly invested by very abundant coarse dark-colored fibers. Though *S. intermedium* Baker has page priority over *S. Coulteri* Baker, I am taking up the latter name since it was based entirely on *Coulter 1569*, which clearly represents the present concept. *Schoenocaulon intermedium* is founded on *Coulter 1568*, representative of our

concept, and *Coulter* 1570, representative of *S. caricifolium* (Schlecht.) Gray.

I have been unable to follow the classification of *Schoenocaulon* recently proposed by Brinker, Ann. Mo. Bot. Gard. **29**: 283-316 (1942). His classification is decidedly unconvincing. His key is short, artificial, and not successful. Though he proposes many new species, his descriptions are cursory and the individual species have no discussion or explanation. Suspicion is immediately aroused by the lack of geographical segregation among the very obviously closely related species he recognizes, as also by their lack of conformity to the familiar patterns of geographical distribution followed by most groups of Mexican plants. This is well exemplified by his classification of the species of the Pacific Coast of Mexico, probably all conspecific and properly called *S. calcicola* Greenm., which he has broken up into *S. calcicola* Greenm., *S. jaliscense* Greenm., *S. megarrhiza* Jones, *S. regulare* n. sp., *S. tenue* n. sp., and *S. Mortonii* n. sp. Material of *S. Coulteri*, as I have defined it, Brinker classifies under *S. Coulteri*, *S. Drummondii* Gray, *S. macrocarpum* n. sp., and *S. texanum* Scheele. The bulb coats quickly distinguish *S. Coulteri* from *S. Drummondii* and *S. texanum*. Brinker's *S. macrocarpum* is a synonym of *S. Coulteri*. *Schoenocaulon caricifolium* (Schlecht.) Gray, which has a synonym in *S. comatum* Brinker, is a plant of east-central Mexico, more closely related to the plant of western Mexico than to *S. Coulteri*. From *S. Coulteri* it is readily distinguished by its more slender spike of smaller flowers and its stouter usually longer pedicellate spreading capsules.

Milla biflora Cav. Icon. Pl. **2**: 76 (1793).

VERNACULAR NAMES: Mayo blanco; Flor de Mayo; Estrellas.

COAHUILA: Sierra Hechiceros, gravelly flat at head of Cañon Madera, locally common, *Johnston & Muller* 1298. CHIHUAHUA: Sierra Hechiceros, Rancho Encampanada, abundant on sunny hillside, white, 4 dm. tall, *Stewart* 199; near Rancho El Pino, 10 km. southeast of Sierra Rica, open sunny slope, frequent, fl. white, *Stewart* 2562; 4 km. east of Tepopote, silty flat, scarce, erect, fl. white, *Stewart* 2365; Pirámide, base of rock-masses, *Johnston* 8150; high valley at northwestern end of Sierra Diablo, sunny open hillsides, not common, erect, fl. white, *Stewart* 965; 31 mi. southeast of Jimenez, scattered on grassy desert valley, fl. white with green stripe down outside of each lobe, *Muller* 3338; plains near Chihuahua, *Pringle* 660.

Ranging from central Mexico northward along the western Sierra Madre to Sonora, Chihuahua, and southeastern Arizona.

Milla Bryani Johnston, Jour. Arnold Arb. **24**: 90 (1943).

VERNACULAR NAME: Sebollin.

COAHUILA: West base of Picacho del Fuste, north-facing slope about limestone rocks, common, fl. white with green lines, *Johnston* 8364; near head of Cañon del Cuervo Chico, rocky slopes and crests of limestone, 1-3 ft. tall, perianth white with green stripe, *Johnston* 8529 (TYPE); Sierra Madera, Cañon Charretera near La Cueva, grassy openings in oak thickets, rocky flat, fl. white, *Johnston* 9123; Sierra Madera, mouth of Cañon del Agua, abundant among desert shrubs in foothills, fl. white, *Muller* 3203; high western end of Sierra Fragua north of Puerto Colorado, opening among brush and pines on ridge, 2-3 ft. tall, not common, corolla white with greenish stripe, *Johnston* 8777; Rancho La Botica, Valle Delicias, open slopes, erect, 3 dm. tall, fl. white, *Stewart* 2848, 2898.

An endemic species closely related to *M. biflora* and replacing it in the limestone mountains of central Coahuila. Differing from its relative in its more elongate and slender corolla and exserted filaments.

Nothoscordum bivalve (L.) Britt. in Britt. & Br. Ill. Fl. N. U. S. 1: 415 (1896).

COAHUILA: Sierra del Carmen, Cañon Sentenela, Wynd & Mueller 589; Sierra Gloria, Marsh 1929; Monclova, 1880, Palmer; Sierra Hechiceros, El Tule, damp soil in arroyo, fairly common, erect, fl. white, Stewart 499; dry steep canyon 5 km. north-east of Jimulco, Stanford et al. 121. CHIHUAHUA: Sierra Hechiceros, Rancho Encampanada, 1940, Stewart. ZACATECAS: Concepcion del Oro, exposed mesas among thorny and scrubby plants, 1904, Palmer 270.

Widely distributed in Mexico and eastern United States.

Muilla Purpusii Brandeg. Univ. Calif. Publ. Bot. 4: 177 (1911).

Bloomeria Purpusii (Brandeg.) Macbr. Contr. Gray Herb. 56: 9 (1918).

COAHUILA: Sierra de la Paila, Oct. 1910, Purpus 4859 (ISOTYPE).

A bulbous plant bearing a slender scape terminating in an umbel of small blue flowers. The species is known only from the type collection. Its generic position is uncertain.

Allium cernuum Roth in Roem. Arch. 13: 40 (1798).

COAHUILA: Sierra del Carmen, Aug. 26, 1936, Marsh 609.

Widely distributed in United States and extending south into northern Mexico. Our material belongs to the southwestern variant which has been called *A. neomexicanum* Rydb.

I am indebted to Prof. Marion Ownbey for identification of the specimens of *Allium* cited in the present paper.

Allium Drummondii Regel, Act. Hort. Petrop. 32: 112 (1875).

COAHUILA: Valley of the Rio Grande near Piedras Negras, April 20, 1900, Pringle 9185; Burro Mts., G. Jermy 170.

Kansas south through Texas and southeastern New Mexico to Coahuila.

Allium glandulosum Link & Otto, Icon. Rar. 1: 33. t. 17 (1828).

CHIHUAHUA: Cañon Madera, southeastern flank of Sierra Rica, frequent on talus slope 5 km. up canyon, oak-pinyon belt, Stewart 2532.

Widely distributed in Mexico. Prof. Ownbey states that the species differs from *A. Kunthii* in having slender fleshy rhizomes produced from the base of the bulbs, and adds that perhaps *A. rhizomatum* Woot. & Standl., from New Mexico, may be a synonym of the species.

Allium Kunthii Don, Mem. Wern. Soc. 6: 82 (1827).

VERNACULAR NAME: Cebolla cimarron.

COAHUILA: Western slope of Sierra del Carmen, 10 km. east of Hac. Encantada, open hillside, Stewart 1690; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, Marsh 1466; Cañon Madera, Sierra Guajes, east of Rancho Buena Vista, hillside, Stewart 1490; high mesa in the Sierra Encantada, 16 km. northwest of Rancho Buena Vista, rocky hillside, Stewart 1441; Sierra Gloria, Marsh 1930; Soledad, 1880, Palmer 2010; 24 km. northwest of Fraile, burnt-off south slope, Stanford et al. 411; west base of Picacho del Fuste, north-facing limestone slope, Johnston 8376; Cañon del Cuervo Chico, rocky bank in open canyon, Johnston 8522A; Sierra Madera, Cañon Charretera, stony open place on canyon floor, Johnston 9151; Sierra Madera, Cañon del Agua, abundant among desert shrubs in foothills at canyon-mouth, Muller 3204; high western

ridge of Sierra Fragua, north of Puerto Colorado, gravelly places along crest, *Johnston 8743*; limestone ridge in foothills of Sierra Cruces, west of Santa Elena, *Johnston 8194*; Picacho de San José, dry open hillside, *Stewart 1107*. CHIHUAHUA: Cañon del Rayo, northeastern side of Sierra Diablo, silty slope, *Stewart 858*; Portrero Mts., east of Mapula station, summit, Sept. 10, 1886, *Pringle 803*. ZACATECAS: Cedros, Aug. 1908, *Lloyd 198*.

Western Texas and New Mexico south to southern Mexico. Growing in rocky soil in sunny places in canyons and on ridges, usually in local colonies. Corolla white to pink.

Calochortus barbatus (H.B.K.) Painter, Contr. U. S. Nat. Herb. **13**: 348 (1911).

Calochortus barbatus subsp. *chihuahuanus* Painter, Contr. U. S. Nat. Herb. **13**: 349 (1911).

Calochortus barbatus var. *chihuahuanus* Macbr. Contr. Gray Herb. **59**: 28 (1919).

CHIHUAHUA: Sierra Santa Eulalia, summits, 1885, *Pringle 328* (isotype of var. *chihuahuanus*).

The species usually has yellow petals. The plant from Santa Eulalia has purplish petals and has been distinguished as var. *chihuahuanus*.

Nolina cespitifera Trel. Proc. Am. Philos. Soc. **50**: 419 (1911).

COAHUILA: Valle de los Guajes, 20 km. south of Buena Vista, grassy flat, *Stewart 1338*; western base of Sierra Guajes, 8 km. east of Buena Vista, igneous hillside, *Stewart 1466*; Sierra del Pino, near La Noria, rocky slopes and arroyo bottom in pine-forest, *Johnston & Muller 595*; Sierra Madera, Cañon Charretera, openings in oak-thickets on flats and in broad arroyos, *Johnston 8956*; western end of Sierra Fragua, north of Puerto Colorado, high ridge with pines on steep rocky brushy slopes, *Johnston 8771*; Buena Vista battlefield, May 21, 1847, *Wislizenus 308* (Mo, TYPE); near Saltillo, high dry lands, Dec. 25, 1847, *Gregg 81*; Carneros Pass area, July 1880, *Palmer*; 3 km. southwest of Fraile, in arroyo, stalks 18 inches tall, *Stanford et al. 343*. CHIHUAHUA: Sierra Rica, Cañon Madera, dry open slopes, *Stewart 2533*.

Known only from our area and from the vicinity of Galeana in the Sierra Madre of Nuevo Leon. The inflorescence becomes 4–9 dm. tall and commonly does not much surpass the large rosette of leaves. The axis and branches of the panicle, especially in the more southern material, may be very much roughened by epidermal protuberances. The capsule, in size, shape, and dehiscence, is much like that of *N. texana* and, as in that species, is soon ruptured, exposing the maturing seeds. The lobes of the ruptured capsule are conspicuously stained with red.

The species is to be confused only with *N. erumpens*, from which it may be readily distinguished by its somewhat yellowish, rather than grayish, green leaves, usually roughened branches of the inflorescence, and smaller soon-dehiscent capsules conspicuously reddish at the base. Its broad leaves quickly separate it from *N. texana* and *N. micrantha*.

Nolina erumpens (Torr.) Wats. Proc. Am. Acad. **14**: 248 (1879).

COAHUILA: Sierra del Carmen, Sept. 7, 1936, *Marsh 810*; near Santo Domingo, limestone hill, *Wynd & Mueller 462*; Hillcoat Canyon, west of Buena Vista Ranch, July 13, 1938, *Marsh 1291*. CHIHUAHUA: Rocky slope of mountains 2–3 mi. east of Virulento, inflorescence 4 ft. tall, *Johnston 8064*.

Known only from trans-Pecos Texas (western Terrell to southern Hudspeth Counties) and south into our area. Torrey appears to have based the species on *Wright 1918*, a collection apparently composed of material

from southern Hudspeth Co. and from eastern Jeff Davis Co., Texas. Torrey's description calls for leaves 6 mm. wide and rounded (semiterete) beneath and seeds bursting the capsules and long persistent. These details, and the specific name, apply to *N. texana*. The material of *Wright 1918* at St. Louis and Cambridge, however, is characteristic *N. erumpens* as currently accepted, with broad flat leaves and seeds filling but not bursting the somewhat angulate and inflated pods. Possibly Torrey's species has been misinterpreted. Because of war conditions, however, I have been unable to examine the type of *N. erumpens*.

Nolina microcarpa Wats. Proc. Am. Acad. **14**: 247 (1879).

Nolina durangensis Trel. Proc. Am. Philos. Soc. **50**: 421 (1911).

CHIHUAHUA: Rocky hills near Chihuahua, 1885, *Pringle 159*; vicinity of Chihuahua, stony bluffs and hills, flowering stems 5–6 ft. tall, 1908, *Palmer 355*.

Ranging from southern Arizona and New Mexico south into Durango. One of the broad-leaved species having a large elongate inflorescence with internodes 4–8 cm. long. The papery long-pedicellate fruits open along the sutures and are not disrupted by the growing seeds.

Nolina texana Wats. var. ***compacta*** (Trel.) Johnston, Jour. Arnold Arb. **24**: 90 (1943).

Nolina affinis Trel. Proc. Am. Philos. Soc. **50**: 417 (1911).

Nolina caudata Trel. Proc. Am. Philos. Soc. **50**: 417 (1911).

Nolina erumpens compacta Trel. Proc. Am. Philos. Soc. **50**: 418 (1911).

CHIHUAHUA: Below the Sandhills [betw. Candelaria and Lucero] on the El Paso-Chihuahua City road, Aug. 17, 1846, *Wislizenus 219* (Mo, excluding the leaf ?); rocky hills near Chihuahua, "fruit and leaves, May," 1885, *Pringle 2* in pt. (GH); rocky hills near Chihuahua, April–May, 1885, *Pringle 1 & 2* (Mo, type of *N. affinis*).

Ranging from trans-Pecos Texas west to southeastern Arizona and south into Chihuahua. A sheet at St. Louis, labeled as composed of *Pringle* no. 1 and no. 2, bears Trelease's designation as type of his *N. affinis*. Although Trelease cited some collections of *N. micrantha* when he published his *N. affinis*, his designated type-specimen entirely represents *N. texana* var. *compacta*. As is very unusual in *Pringle's* superb collections, his specimens of *Nolina* numbered 1 and 2 (the first numbers in his famous set of Mexican exsiccatae) seem to be mixtures of two species. In his published diary he mentions collecting material for his no. 1 in Bachimba Canyon (i.e. between Mapula and Horcasitas stations, 20–35 km. southeast of Chihuahua) on April 2, 1885, and again on April 4, "on ledges northeast of house" on the northeastern outskirts of Chihuahua. He mentions collecting *Nolina* no. 2 in Bachimba Canyon on May 22. I suspect that the material obtained on the outskirts of Chihuahua and that obtained in Bachimba Canyon were different species, one being *N. texana* var. *compacta* and the other *N. micrantha*. Flowering and fruiting material of both species were distributed mixed under the two numbers.

Nolina micrantha Johnston, Jour. Arnold Arb. **24**: 91 (1943).

COAHUILA: Sierra Hechiceros, vicinity of Rancho El Tule, rocky slopes and flats, *Johnston & Muller 1326* (TYPE), *Stewart 490*. CHIHUAHUA: Sierra Hechiceros, Rancho Encampanada, sunny hillside, *Stewart 193*; Organos, base of grassy oak-clad

hills, *Stewart & Johnston 2072*; rocky hills near Chihuahua, May 1885, *Pringle 2* in pt.; vicinity of Santa Eulalia, common on stony hills and mesas, 1908, *Palmer 139*.

An endemic species with thick narrow leaves resembling those of *N. texana*. It is probably most closely related to *N. texana*, but differs in its distinctly smaller flowers, larger looser inflorescence with less rigid, less twiggy, more slender and elongate branches, purpurascens capsules, and minute less lacerate bractlets.

Dasyllirion cedrosanum Trel. ex Lloyd, Publ. Carnegie Inst. **139**: 23 (July 1911); Trel. Proc. Am. Philos. Soc. **50**: 431 (Aug. 1911).

Dasyllirion Palmeri Trel. Proc. Am. Philos. Soc. **50**: 432 (1911).

? *Dasyllirion texanum aberrans* Trel. Proc. Am. Philos. Soc. **50**: 434 (1911).

VERNACULAR NAMES: Sotol; Cortadilla; Sotol cenizo.

COAHUILA: Mouth of Cañon de la Cruz, 20 km. south of Ocampo, common, *Johnston 9182*; vicinity of Aguaje Pajarito at west end of Sierra Fragua north of Puerto Colorado, common, *Johnston 8720*; Monclova, 1880, *Palmer 1315* (Mo, photo of type of *D. texanum aberrans*); Puerto San Lazaro, 1936, *Wynd & Mueller 165*; Rancho La Luz, Sierra de la Paila, April 22, 1905, *Endlich 7* (Mo); San Lorenzo Canyon, southeast of Saltillo, 1905, *Palmer 696* (type of *D. Palmeri*); near Saltillo, Dec. 25, 1847, *Gregg 78*. ZACATECAS: Near Cedros, foothills, June 1908, *Lloyd 118* (Mo, TYPE); Cedros, June 1908, *Kirkwood 96* (Mo, GH), *Lloyd 82* (Mo).

A coarse plant with large, dull, rarely glaucescent leaves 20–25 mm. wide bearing stout antrorsely curved marginal thorns. The species is known only from our area.

Dasyllirion Stewartii Johnston, Jour. Arnold Arb. **24**: 92 (1943).

Dasyllirion Stewartii var. *glaucum* Johnston, Jour. Arnold Arb. **24**: 93 (1943).

VERNACULAR NAME: Sotol.

COAHUILA: Vicinity of Santa Elena, eastern foothills of Sierra Cruces, common, *Stewart 823* (TYPE), *841*; 7 mi. north of Santa Elena, *Johnston & Muller 331*; 3 mi. northwest of El Oro on road to Esmeralda, *White 1970*. CHIHUAHUA: Mouth of Cañon del Rayo, Sierra Diablo, *Stewart 957* (type of var. *glaucum*).

A coarse plant much resembling the more southern and eastern *D. cedrosanum*, from which it differs by having the stout curved marginal thorns of the leaves retrorse rather than antrorse. The typical form of the species in the Sierra de las Cruces has dull green leaves. Collections from the Sierra Mojada and Sierra Diablo, further south, have very pale glaucous leaves and have been described as var. *glaucum*.

Dasyllirion texanum Scheele, Linnaea **23**: 140 (1850).

VERNACULAR NAME: Sotol.

COAHUILA: Monclova, Aug. 1880, *Palmer 1315*; Sierra del Pino, abundant on dry rocky slopes and crests along high eastern ridge east of La Noria, scape 8–15 ft. tall, *Johnston & Muller 657*.

A species with narrow (up to 15 mm. wide) lustrous green leaves with sharp antrorse marginal thorns. This is a plant centering on the Edwards Plateau and probably entering Coahuila from the northeast.

Dasyllirion heteracanthum Johnston, Jour. Arnold Arb. **24**: 92 (1943).

VERNACULAR NAME: Sotol.

COAHUILA: Western base of Picacho del Fuste, frequent on rocky slopes and flats, *Johnston 8428* (TYPE).

This species is closely related to both *D. texanum* and *D. leiophyllum* and grows in an area between these two species; possibly it intergrades with both of them. It is known from the Big Bend area of Texas and the area eastward to the lower Pecos. It differs from its relatives in its somewhat broader, usually non-lustrous leaves with usually straight divaricate marginal thorns. Occasional thorns on the leaf-margins may be weakly curved, but the thorns are not like cats-claws and neither antrorse as in *D. texanum* nor retrorse as in *D. leiophyllum*.

Dasyllirion leiophyllum Engelm. ex Trel. Proc. Am. Philos. Soc. **50**: 433 (1911).

CHIHUAHUA: Sierra Santa Eulalia, 1885, *Pringle 149*; northwest of Chihuahua, *LeSueur 565*; vicinity of Chihuahua, 1908, *Rose 11682* in pt. (Mo).

A plant with narrow lustrous green leaves 14–19 mm. wide, armed with stout recurved marginal thorns. The type was collected at Presidio by Havard in 1880. In Texas the species ranges from Presidio and Jeff Davis Counties westward along the mountains near the Rio Grande and is reported as extending into the mountains of southeastern New Mexico. Information regarding its distribution in Chihuahua is fragmentary. I have observed the plant on limestone slopes near Charca de Peña, about 120 km. east of Chihuahua. I saw no plants of *Dasyllirion* during my journey by railroad from Chihuahua to Ojinaga, although numerous limestone mountains were seen on which it might be expected. Most of central eastern Chihuahua being composed of volcanic rocks, it is not surprising that *Dasyllirion* is absent in that area.

Dasyllirion Wheeleri Wats.; Rothrock in Wheeler, Rep. U. S. Surv. 100th Meridian **6**: 378 (1878).

Dasyllirion durangensis Trel. Proc. Am. Philos. Soc. **50**: 438 (1911).

Dasyllirion Wheeleri Wislizeni Trel. Proc. Am. Philos. Soc. **50**: 439 (1911).

CHIHUAHUA: Near Lake Santa Maria, 1899, *Nelson 6392*.

Ranging from southern Arizona and New Mexico south in the highlands of Chihuahua and Sonora to Durango. Trelease reports his *D. Wheeleri Wislizeni* from the mountains near El Paso and adjoining Chihuahua to the south. The species has leaves usually 15–20 mm. wide armed with stout antrorse marginal thorns. The typical Arizona plant has pale foliage. The New Mexican material appears to be usually green. The large, broadly winged, usually deeply notched fruits have a conspicuous pedicel. The staminate clusters are usually evidently pedunculate. The evident pedicels and peduncles are useful characters in distinguishing the species.

Dasyllirion Berlandieri Wats. Proc. Am. Acad. **14**: 249 (1879).

COAHUILA: Angostura, south of Saltillo, May 21, 1847, *Wislizenus 307* (Mo).

The cited specimen is a poor one, but it may represent *D. Berlandieri*, or possibly juvenile *D. cedrosanum*. *Dasyllirion Berlandieri* ranges in the Sierra Madre of Nuevo Leon from near Monterey south at least to the Galeana area and can be expected within the Coahuilan borders. It has dull green leaves, 15–30 mm. wide, with numerous small relatively weak antrorse marginal thorns. Its broadly winged deeply notched fruit tends to be broader than long.

Hesperaloe funifera (Koch) Trel. Rep. Mo. Bot. Gard. **14**: 36. t. 3-4 (1902).

VERNACULAR NAME: Samandoque.

COAHUILA: Allende, 1939, *Marsh* 1751; Valle de los Guajes, 14 km. south of Rancho Buena Vista, colony on grassy flat, *Stewart* 1345; near Rancho Santa Teresa, south of Castaños, *Wynd & Mueller* 187; Monte de San Vicente, below Cañon Espantosa, south-east of Cuatro Cienegas, *Schroeder* 167; several miles west of Buena Vista [west of Puerto Caballo], silty grassy flat, clumps scattered, *Johnston* 8313; about 15 km. east of San Antonio de los Alamos, brushy flats, local colony, *Johnston* 8294; Cerro del Cypriano, near Mohovano, June 1910, *Purpus* 4508.

A yucca-like plant growing on clay and stony flats and on gentle slopes along the base of sierras. It appears to favor moderately gypsiferous soils and possibly because of this fact usually grows on Upper Cretaceous beds or on outwash near them. Though the species occurs over a large area, its distribution is discontinuous and seemingly erratic. It may be present, scantily or in local abundance, and then absent for considerable distances. In addition to stations represented by specimens cited, it has been observed also in the area south of Peyotes, south of Laguna de Leche, north of Puerto Colorado, near Matrimonio, and on the Atravesada between El Oro and Esmeralda. South of our area it has been collected about 150 km. east of San Luis Potosí, at Hacienda de Angostura, a distant area sharing a large number of peculiar plants with the area about Cuatro Cienegas. It has been reported in cultivation, for its fibers, at Bustamente in the mountains of southwestern Tamaulipas. Various stations for the species are known in northern Nuevo León.

It is a plant of distinctive appearance. It is acaulescent and its large, erect, usually clustered rosettes are composed of relatively few, strictly ascending, stiff, elongate leaves 1-1.8 m. long. The leaf-blades are concavo-convex, lustrous and beautifully lineate-grooved beneath and very stiffly and coarsely fibrous on the margins. The slender-stemmed inflorescence becomes 3 m. tall, with the upper two-fifths bearing a few slender divaricate branches 3-12 dm. long. The small nearly rotate corolla is greenish yellow or slightly stained with purple.

Yucca Torreyi Shafer in Britton & Shafer, No. Am. Trees 157 (1908); McKelvey, *Yuccas of S.W. U. S.* **1**: 104-117. t. 52-58 (1938).

Yucca baccata var. *macrocarpa* Torr. Bot. Mex. Bound. 221 (1859).

Yucca macrocarpa (Torr.) Merriam, No. Am. Fauna **7**: 358 (1893); Trel. Rep. Mo. Bot. Gard. **13**: 110. t. 70-71 (1902); not *Y. macrocarpa* Engelm. (1881).

VERNACULAR NAMES: Palma China; Palma de San Juan; Palma de Pita; Palma criolla; Palma cenisa; Palma loca.

COAHUILA: Muzquiz, *Marsh* 1162; 20 mi. north of Hipolito, on desert, *Wynd & Mueller* 67; flats of La Vega, about 15 km. southeast of Cuatro Cienegas, *Schroeder* 84; foothills of Sierra Cruces, near Santa Elena, frequent, *Johnston & Muller* 332.

This species centers in our area and extends north across the Rio Grande into western Texas and adjoining New Mexico. It has been reported as far south as San Juan de Guadalupe, in the easternmost corner of Durango. The plant grows in limestone as well as igneous areas, and is found among desert scrub in the broad valleys, scattered in grasslands, occasional on rough basaltic slopes, but best developed in the foothills of limestone mountains, where, in the company of *Yucca carnerosana* and *Dasyllirion*,

it is frequently rather common. It occurs at much lower altitudes than *Y. carnerosana* and does not ascend as high in the mountains. It usually grows singly or in small groups and scattered, and it never forms great congregations, the so-called "Palmares," as does *Y. carnerosana*.

It is usually an unkempt plant, commonly 3–5 m. tall, normally with several simple trunks. These trunks, thatched with reflexed dead leaves, bear an elongate, rather untidy head of stiff sword-like grayish leaves. The leaves of *Y. carnerosana* radiate from a hemispherical axis, forming a tidy symmetrical globose cluster. The axis of *Y. Torreyi* is elongate, and the head of leaves is distinctly longer than broad. Its leaves do not spread regularly and the leaf-cluster is usually confused and untidy because of seemingly crossed leaves and lack of perfect symmetry. Compared with the trim dignified plants of the aristocratic *Y. carnerosana*, those of *Y. Torreyi* seem disheveled and somewhat ill-nourished, though individually more interesting because their form of growth is less stereotyped.

Exploration has shown that *Y. Torreyi*, formerly known only from western Texas (the type came from the Davis Mts.), is generally distributed in Coahuila and eastern Chihuahua south into northeastern Durango and northern Zacatecas. Southern plants of *Y. Torreyi* have the appearance and behavior of the plants along the Rio Grande and are obviously conspecific with them. Trelease, however, while maintaining *Y. Torreyi* (under the name *Y. macrocarpa*) as a valid species in trans-Pecos Texas and adjoining Mexico, failed to recognize that the species extends into the southern and eastern portions of our area. Plants from these latter portions of our area Trelease identified as typical *Y. Treculeana*. Mrs. McKelvey, l.c., p. 75, has shown that true *Y. Treculeana* is the plant of southern Texas, Tamaulipas, and eastern Nuevo Leon which Trelease called *Y. Treculeana* var. *canaliculata*. She has also shown that the plants of Texas, in the area between Uvalde and the mouth of the Rio Pecos, adjoining northeastern Coahuila, which Trelease included in the typical variety of "*Y. Treculeana*," are also referable to *Y. Torreyi*. *Yucca Treculeana* possibly may enter Coahuila on the Rio Grande Plain in the very extreme northeastern portions of the state. The Coahuilan plants, however, which Trelease and others have called "*Y. Treculeana*" probably all belong to *Y. Torreyi*.

Yucca carnerosana (Trel.) McKelvey, *Yuccas of S.W. U. S.* 1: 24 (1938).

Samuela carnerosana Trel. Rep. Mo. Bot. Gard. 13: 118. t. 76–81 (1902).

VERNACULAR NAMES: Palma de San José; Palma de San Pedro; Palma barreta; Zamandoque.

COAHUILA: Sierra del Pino, abundant on hillsides and valleys, *Johnston & Muller* 712; eastern foothills of Sierra Cruces near Santa Elena, common, *Johnston & Muller* 1013; near Saltillo, 1898, *Palmer* 197; mouth of San Lorenzo Canyon, southeast of Saltillo, 1903, *Dewey* 578 (US); Carneros Pass, limestone hillsides, *Pringle* 3912 (ISO-TYPE); Carneros Pass, 1900 and 1905, *Trelease* 58, 167 (Mo). ZACATECAS: Cedros, hills and foothills, *Lloyd* 35 (US); Mazapil, *Lloyd* 35 (Mo).

A common and characteristic plant of rocky limestone soils on the plateau from the Big Bend area in Texas south into San Luis Potosi, and a familiar

feature on mountain-sides and in open mountain valleys up into the lower parts of the Oak Belt. It may occur, sometimes abundantly, on rocky pediment slopes along the mountains, but probably it rarely descends below 4000 ft. altitude. It is the most conspicuous element in that characteristic zone of vegetation on limestone sierras of western Coahuila, appropriately called the "Palma Belt."

The trunk becomes 2-4 m. tall and rarely even taller, and, though several may spring from the ground together, they are seldom branched. The stout trunk is commonly clothed with reflexed dead foliage and above bears a large trim globose cluster of rigid radiating sword-like leaves. It is said to flower in April and May.

The species is probably present on most limestone mountains of Coahuila except some in the eastern portions of the state. Its exact eastern limit has not been determined. Mr. Stewart reports that it is abundant on the western slopes of the Sierra del Carmen near Hacienda Encantada. Farther south I have seen it near La Mula and in the foothills of the Sierra Madera south of Ocampo. It is said to be abundant in the Sierra de la Paila. The large yuccas growing in oak-thickets along the crest of the high ridge just east of Saltillo, along the steep grade to Diamante, probably belong to the species. It is to be expected elsewhere along the western flank of the Sierra Madre. In southern Coahuila it is present, frequently in great abundance, in the east-west mountain ranges from Carneros Pass (the type locality) west to the extremity of the Sierra de Parras southwest of Parras. It is reported as common in extreme northeastern Zacatecas, at least as far west as Cedros, and Endlich, *Beiheft z. Tropenpflanzer* 9: 248 (1908), reports it from the Sierra de Ramires, farther west, within the extreme eastern corner of Durango. Farther north in northeastern Durango I know it from the area about Mapimi, and westward, along the road to Palmito Dam, on the mountains about Cadena and some miles beyond.

Information regarding the distribution of the species in Chihuahua is very incomplete. Near the Coahuilan border in extreme southeastern Chihuahua the plant is known from the Sierra Almagre and the Sierra Diablo. The middle portion of eastern Chihuahua is largely composed of igneous rocks on which *Y. carnerosana* is absent. Farther north, however, there are limestones. I have seen the plant in the Sierra San Carlos, in the hills 10 miles south of Mula, and along the road northwest from Castillon, Coah., as far west as Tascate. Along the railroad between Chihuahua City and Ojinaga a yucca with the familiar habit of the Coahuilan plant is common on all limestone mountains northeast of Las Trancas. The limestone mountains in this portion of Chihuahua have a north-south orientation and extend in broken chains north to the Rio Grande. The large yucca seen on the various sierras northeast of Las Trancas, accordingly, can be expected to range north to the Rio Grande and should therefore approach the range of *Y. Faxoniana*, an extremely close relative of *Y. carnerosana*, which is common in the limestone mountains along the Rio Grande south of Sierra Blanca and Van Horne, Texas. The plants seen along the

Chihuahua-Ojinaga railroad possibly may represent *Y. Faxoniana* or forms connecting it with *Y. carnerosana*.

Yucca filifera Chabaud, Rev. Hort. **48**: 432. f. 97 (1876); Carrière, Rev. Hort. **52**: 376. f. 75-77 (1880), op. cit. **56**: 53. f. 12, 13 (1884); Baker, Garden and Forest **1**: 78. f. 13, 14 (1888).

Yucca baccata var. *australis* Engelm. Trans. Acad. Sci. St. Louis **3**: 44 (1873).

Yucca australis (Engelm.) Trel. Rep. Mo. Bot. Gard. **3**: 162. t. 3, 4 (1892), op. cit. **13**: 103. t. 60, 61 (1902).

VERNACULAR NAMES: Palma china; Palma loca; Palma grande.

COAHUILA: Saltillo, tree yucca, 1898, *Palmer 197*; Parras, etc., sterile plain, largest specimens seen 15-25 ft. high, trunks often 2-3 ft. thick, Nov. 1852, *Thurber 857*.

A large *Yucca*, with pendulous inflorescence and baccate fruits, which becomes much branched and arborescent. It is reported to become 15 m. in height and to develop a trunk over 2 m. thick. In our area, trees 8-12 m. high are not uncommon. It is a plant of the broad valleys in the southern parts of our area, where it is frequently found in large colonies. From north of Monterey, N. L., it ranges on the east side of the Sierra Madre south into western Tamaulipas. It enters our area via the valleys northwest and west of Monterey. It grows in the valley near Saltillo and in the plain south of the Sierra Gavia, about 100 km. to the northward. West of Saltillo it is known from between General Cepeda and Seguin and about Parras. It appears to be widely distributed in northern Zacatecas. Kirkwood, Pop. Sci. Monthly **75**: 442 (1909), states that in this latter area it often occurs with *Y. carnerosana* but has lower altitudinal limits and is primarily "a native of the wide valley lands, where it often occurs in great profusion as at Palmas Grandes, a few miles west of Mazapil, and again on the footslopes some twenty miles east of Camacho." In extreme eastern Durango, Trelease reports the species as present along the railroad "in varying quantity, about La Mancha and thence south to about Symon." According to Trelease the species extends south through San Luis Potosi to Queretaro.

The name *Yucca filifera* is based upon a plant flowering under cultivation in France and said to have been introduced from Mexico by Roezl. The descriptions and illustrations of the plant clearly apply to the present species and antedate by over twenty years the name *Yucca australis*, coined and given currency by Trelease. Trelease's binomial is based upon *Yucca baccata* var. *australis* Engelm., a name founded upon material of the present species collected by Thurber near Parras and by Gregg near Saltillo. It is possible that our species may have earlier names, antedating even *Y. filifera*, in *Yucca scabrifolia* Baker and *Yucca polyphylla* Baker, Gard. Chron. **1870**: 1088 (1870). These latter species were named by Baker upon the basis of small sterile plants of unknown origin cultivated in England. While it is possible that they may represent *Y. filifera*, the descriptions of them published are brief, incomplete, and ambiguous, and, in addition, the names are probably to be rejected as provisional names, since, when publishing them, Baker remarked that "I give now a provisional name for each of them, and an epitome of the notes which I have

already made, reserving diagnosis and full description for our intended monograph . . .” Baker failed to amplify his original remarks and later, Jour. Linn. Soc. **18**: 228 (1880), indicated, without actually making trinomials, that they were only varieties of *Y. baccata*.

Yucca Endlichiana Trel. Rep. Mo. Bot. Gard. **18**: 229. *t.* 15–17 (1907); Endlich, Beiheft z. Tropenflanzer **9**: 260 (1908).

VERNACULAR NAME: Pitilla.

This remarkable acaulescent fleshy-fruited yucca was apparently based upon material collected south of the Sierra Paila near Marte Station. It spreads by rhizomes and its rosettes of few strictly ascending or erect leaves (2.5–5 dm. long) are crowded to form dense clumps of moderate size. The inflorescence is shorter than the leaves. The small, cream to brownish or purplish flowers are described as 15 mm. long and borne on slender elongate pedicels over 25 cm. in length. The fruit is said to be 25–30 mm. long, subglobose to broadly ellipsoid, and not very fleshy. Endlich reports that it is usually found in very dense, sharply defined, usually not very extensive clumps among the desert scrub in the area between the Sierra de Parras, the Sierra del Rosario, and the Sierra de la Paila, where, especially in the Valle de Rosario, it is common. The smooth dark green or bluish green leaves have a brown margin bearing stiffish recurving fibers.

Yucca elata Engelm. Bot. Gaz. **7**: 17 (1882).

VERNACULAR NAMES: Palmito; Sollate.

COAHUILA: Rancho El Pino, fairly common on sandy flat, *Stewart 1781*; 1 mi. south of Las Norias, 20 mi. north of Esmeralda, silty soil especially about sabanetas, trunk 1–6 ft. tall, inflorescence 4–8 ft., fibers detaching and curling up at leaf-bases, *Johnson & Muller 348*; 1 km. south of Las Norias, colony on silty flat, *Stewart 362*; east of Laguna de Jaco, confined to gypsum ridges, common, trunk to 5 ft., *Johnston & Muller 1077*; 4 km. southeast of Laguna del Rey, sandy slope, common, 2 m. tall, *Stewart 2655*. CHIHUAHUA: Hills around Juarez, 1912, *Stravus* (Mo); international boundary near White Water, June 18, 1892, *Mearns 363* (US); between Casas Grandes and Sabinal, *Nelson 6371*; Moctezuma, 1900, *Trelease 400* (Mo); Chihuahua, 1900, *Trelease 399* (Mo); 10 mi. west of Julimes, frequent on sandy plain, *Stewart & Johnston 2097*; southeast of San Pablo, April 30, 1847, *Gregg* (NY).

Ranging from Arizona east into Brewster County, in trans-Pecos Texas, and south into our area, where it is restricted to finely divided, usually valley soils. In our area it grows on silts, sandy soils, and gypsum in locations where there is evidence of moderate amounts of subterranean water, or in places where the storm waters collect and the soil beneath the surface remains moist during the growing season. In Coahuila and Chihuahua it is found in the open valleys and on rolling country dominated by grass or desert scrub. The species is uncommon in Coahuila and apparently is restricted to the western portions of the state. In addition to the Coahuilan stations from which I have cited specimens, I know it only near Castillon, where occasional plants grow about sabanetas. It probably grows in the northwest corner of the state, for it has been collected near the Rio Grande near the tip of the Big Bend at San Vicente, Texas. In northeastern Chihuahua I have seen the species, usually represented by only a few plants, at various places between Ojinaga and Chilicote, near Trincheras,

along the road between Pirámide and Castillon, between San Francisco and Mesteñas, and between Organos and Charca de Peña.

Yucca rostrata Engelm. ex Trel. Rep. Mo. Bot. Gard. **13**: 68, t. 40-42 (1902).

Yucca rostrata var. *linearis* Trel. Rep. Mo. Bot. Gard. **13**: 226 (1907).

Yucca rostrata forma *integra* Trel. Rep. Mo. Bot. Gard. **22**: 102 (1911).

VERNACULAR NAMES: Soyate; Amole.

COAHUILA: Peyotes, April 27, 1900, *Trelease* (Mo); Allende, *Marsh* 1757; Sabinas, May 21, 1902, *Nelson* 6231 (US, Mo), 6831 (NY); Hac. Mariposa at Puerto Santa Anna, *Wynd & Mueller* 257; abundant in Hac. La Babia, northwest of Sabinas, March 10, 1906, *Endlich* 1161 (Mo; type of forma *integra*); Sierra del Carmen, 3 km. northeast of Hac. Encantada, common on hillsides, 2 m. tall, *Stewart* 1582; Berrendo, 3 m. tall, flower stalk 7 m. high, fruit with offensive odor, *White* 1861; Monclova, Aug. 1880, *Palmer*; Monclova, tree 8-10 ft., panicle 2.5-3 ft. long, much branched, Aug. 1880, *Palmer* (Mo, TYPE); east of La Rosa, dry mountain slope, *Wynd & Mueller* 47; Sierra Pata Galana, March, *Purpus* 5586 (UC); Sierra Parras, rocky canyons, April 1905, *Purpus* 1132 (UC); Parras, April 9, 1905, *Purpus* (Mo); Parras, March 1905, *Purpus* 1103 (UC); two plants from canyons of Sierra Parras received at Mo. Bot. Garden June 5, 1905, *Purpus* (Mo, type of var. *linearis*).

Extending from just within Texas (Boquillas area, and 6 mi. above mouth of Maravillas Canyon) in the Big Bend Region, south through eastern Coahuila to west of Saltillo and then west across southern Coahuila. It is known only from areas of limestone rock. It grows in rocky places on hillsides and along arroyos. Reports of the species from Chihuahua are almost certainly erroneous. Among our three species with flexible pallid leaves with a horny yellow margin, *Y. rostrata* is readily distinguished by its remarkable rostrate capsules. The fruit is ovoid with the upper third gradually contracted into a coarse stout beak 2-3 cm. long. The type of the species was collected near Monclova. The species usually has the leaf-margins denticulate, but plants with smooth or nearly smooth margins appear to be not uncommon. One of these latter forms, from Hacienda La Babia, was described as forma *integra* Trel.

The material cited from southern Coahuila has narrow leaves. The northern typical plants have leaf-blades 7-13 (usually 8-12) mm. wide and 3-6 dm. long. *Trelease* based his var. *linearis* upon material collected by *Purpus* in the Sierra de Pata Galana and Sierra Parras which has narrowly linear blades 3-4 mm. wide and 4 dm. long. Some collections from Parras (*Purpus* 1132) are less extreme. Mrs. McKelvey, who had made a detailed study of all available material of *Y. rostrata* and *Y. rigida*, tells me that she suspects there are one or more undescribed species of *Yucca* in southern Coahuila and that one of these may be represented among the not very satisfactory collections of *Purpus* which I have cited above. She is particularly suspicious of *Purpus* 1103 from Parras, *Purpus* 5583 from Sierra Pata Galana, and *Purpus* 7717 from Viesca, in which the associated flowers are smaller in size and different in form from any known in indubitable *Y. rostrata* and its allies. Some of *Trelease*'s original suite, other than the type, of var. *linearis* may also represent this aberrant plant. Obviously, until there are good new collections of this group of yuccas of southern Coahuila, showing mature foliage, flowers, and fruit, their classification must remain doubtful and tentative.

Yucca Thompsoniana Trel. Rep. Mo. Bot. Gard. **22**: 101. *t.* 104-107 (1911).

VERNACULAR NAME: Palmilla.

COAHUILA: Santa Elena, eastern foothills of Sierra Cruces, rocky hillsides and slopes, trunk 1-4 m., frequent, *Stewart* 2279; near Santa Elena, frequent, especially on limestone ledges, stems usually about 6 ft. tall, *Johnston & Muller* 329; arid hills near La Pistola, eastern border of Llano de Guaje, stems to 10 ft., locally common on limestone ledges, *Johnston & Muller* 771; western base of Picacho del Fuste, along arroyos and along terraces of cemented gravels, frequent in colonies, *Johnston* 8458; just east of Laguna de Leche, along steep rocky arroyo, colonies, stems 8-12 ft. tall, leaf-margins smooth, *Johnston* 8603, 8604, 8605; east of Rosario station, large local colony on gravelly outwash from canyon, trunks to 8 ft., leaf-margins smooth, *Johnston* 8831.

A species of western Texas, from Presidio to Val Verde County, and ranging south into our area. Apparently restricted to limestone. The type specimen was collected by Bigelow from mountains at "Bufatello near Presidio del Norte." Aug. 10, 1852, presumably along the Rio Grande in Presidio Co., Texas, or across the river in adjoining Chihuahua. In northeastern Chihuahua I have seen the species on the pass about 10 miles south of Mula and on the hillsides 5-10 miles northwest of San Carlos. The plant is apparently widely distributed in western Coahuila on limestone hillsides, frequently about ledges, or along terraces of limy conglomerate along arroyos, and rarely in gravels of alluvial fans about the mouths of canyons. It commonly occurs with *Yucca carnerosana* but has somewhat lower altitudinal limits. Frequently locally common but usually scattered. I have observed the species, without collecting it, in the Sierra Almagre, between Esmeralda and El Oro, on the Sierra Aplanchada, west of San Antonio de los Alamos, in the southern canyon of the Sierra del Pino, in canyons southeast of Puertecito, and in hills north of Tanque Colorado. The yuccas observed on the steep canyon-sides of Cañon del Agua, just north of Cuatro Cienegas, probably were of this species, though possibly they may represent *Y. rostrata*.

Yucca Thompsoniana is one of the three species in our area having flexible elongate pallid leaves with horny yellow margins. It ranges in western Coahuila and adjoining Chihuahua, whereas *Y. rostrata* occupies the limestones in eastern (and apparently southern) Coahuila, and *Y. rigida* occupies the limestone areas from northeastern Chihuahua south into northeastern Durango.

Yucca rigida (Engelm.) Trel. Rep. Mo. Bot. Gard. **13**: 65. *t.* 35, 36 (1902).

Yucca rupicola var. *rigida* Engelm. Trans. Acad. Sci. St. Louis **3**: 49 (1873).

Yucca rigida inermis Trel. Rep. Mo. Bot. Gard. **22**: 102 (1912).

VERNACULAR NAMES: Palma San José; Palmito.

CHIHUAHUA: Sierra Santa Eulalia, 1885, *Wilkinson* (US, UC); rocky hills near Chihuahua, flowers April 17, 1885, fruit May 17, 1885, *Pringle* 165; Picachos station, 1941, *Johnston*; dry valley between Mapimi and Jimenez, rather common, 5-10 ft. tall, with seed-pods, April 18, 1847, *Gregg* 477 (Mo, TYPE). DURANGO: South of Picardias, in box-canyon, Aug. 20, 1900, *Trelease* 396 (Mo). ZACATECAS: Mountains near Symon, June 1908, *Lloyd* 128; Sierra del Chivo, near Symon, June 1908, *Lloyd* 77 (Mo, type of forma *inermis*; UC, leaf-margins denticulate).

Under the present species are grouped plants of Chihuahua, north-

eastern Durango, and adjoining Zacatecas which have pallid flexible leaves with horny yellow margins. Information regarding them is fragmentary and the collections representing them are few and incomplete. Possibly more than one species is involved. These western plants are most closely related to *Y. Thompsoniana* but appear to differ from that more easterly ranging species in having somewhat broader and longer leaves and tougher capsules said to have the valves flattened on the back. Until more collections are available for study, the species must remain puzzling, obscure, and somewhat questionable.

The type of *Y. rigida*, a specimen consisting of leaves and capsules, was collected by Gregg on April 18, 1847 between Mapimi and Jimenez, while traveling rapidly with a small group of mounted soldiers carrying an urgent message from Saltillo to Chihuahua City. On April 18th the party traveled from Arroyo del Cerro Gordo, on the Durango-Chihuahua border (80 mi. northwest of Mapimi), to a point in the desert about 25 mi. southeast of Jimenez. Traveling rapidly, Gregg must have had little time to collect plants. Possibly he may have been able to collect the yucca on the mountain-side or in the canyon at San Bernardo (30 mi. southwest of Escalon), where the party rested at mid-day.

With Gregg's specimen, Trelease associated material he collected at the southeastern end of the Sierra Hispaña, not far from Picardias, a station in the valley of the Rio Aguanaval. He reports that the plant "is abundant on or near rocky hillsides" near Picardias and along the railroad to about Jalisco, a station 10 km. farther southeast. The same species has been collected in the Sierra del Chivo, near Symon, along the same railroad about 100 km. still farther to the southeast. Collections from the latter locality (Lloyd 77) with smooth leaf-margins have been described as *Y. rigida inermis*. The type of this form at St. Louis does have smooth entire leaf-margins. However, a duplicate of the same collection at Berkeley has the leaf-margins denticulate.

In addition to the plants of Durango, Trelease also associates with Gregg's collection a yucca that has been collected in the general vicinity of Chihuahua City. Trelease mentions the Sierra Santa Eulalia. Wilkinson's material is labeled as from that range of mountains. Pringle's collection, no. 165, is given as from "rocky hills near Chihuahua" and as made up of flowers collected April 17, 1885, and fruit collected May 17, 1885. According to Pringle's published diary he was in Bachimba Canyon, 25-35 km. southeast of Chihuahua, on April 17th, and on that date he particularly mentions collecting "flowers of 165." On May 17, 1885, the date on which the fruit of the yucca is given as collected, Pringle was botanizing in a large canyon (in the Sierra Guadalupe?) southwest of Jimulco, just inside the Durango boundary about 25 km. southeast of Picardias, where Trelease found *Y. rigida*. Unless there is an error in the printed date appearing on Pringle's label, one must conclude that the fruit associated with Pringle 165 did not grow on the "rocky hills near Chihuahua."

Probably to be associated with the plant collected about Chihuahua is

the yucca with pale yellow-margined leaves which is frequent on limestone hills along the Chihuahua City-Ojinaga railroad from near Trancas to near the Rio Conchos. This plant suggests *Y. Thompsoniana* but is coarser, with a larger head of leaves. Plants examined near Picachos Station had leaves 25–30 mm. wide and 5–6 dm. long.

AMARYLLIDACEAE

Cooperia Drummondii Herb. Bot. Reg. **22**: t. 1835 (1836).

VERNACULAR NAME: Cebollita.

COAHUILA: Santa Anna Canyon, *Marsh 535*; Hac. Encantada, hillside, fl. white, *Stewart 1738*; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh 1450*; battlefield near Buena Vista, fl. white, *Gregg 84*; 7 km. west of Santa Elena, Sierra Cruces, black loam on hillside, *Stewart 1738*.

Northeastern Mexico (? and Oaxaca) north to New Mexico, Kansas, and Louisiana.

Cooperia pedunculata Herb. Amaryll. 179. t. 42 (1837).

VERNACULAR NAME: Flor de Mayo.

COAHUILA: Sierra San Vicente, Cañon Espantosa, April 27, 1941, *Schroeder 1*; near Saltillo, stony hillsides, fl. white, sweet scented, April 1898, *Palmer 70*.

Northeastern Mexico and eastern half of Texas.

Zephyranthes Lindleyana Herb. Amaryll. 174. t. 35 (1837).

ZACATECAS: Cedros, *Lloyd 40*.

Ranging from Hidalgo northward into Nuevo Leon and westward onto the plateau to San Luis Potosi, Charcas, and Cedros. To be expected in southern Coahuila. The corolla is pink.

Zephyranthes longifolia Hemsl. Diag. Pl. Nov. **3**: 55 (1880).

VERNACULAR NAME: Cebollita.

COAHUILA: 2 mi. west of San Rafael, tobose flat, *Stewart 657a*; valley west of Bufido, silty soil, *Johnston & Muller 845B*; La Azufrosa, fl. yellow, *Gregg 491*; Saltillo, stony hill-slope, fl. lemon-yellow, 1898, *Palmer 219*. CHIHUAHUA: Valley 30 km. northwest of Jaco, silty flat, fl. yellow, *Stewart 683*. ZACATECAS: Cedros, hills, *Lloyd 124*.

From San Luis Potosi north to western Texas and Arizona, usually on valley silts.

Agave (Manfreda) brunnea Wats. Proc. Am. Acad. **26**: 156 (1891).

VERNACULAR NAME: Huaco.

COAHUILA: 10 km. east of La Palma, gravelly hills north of Sierra Cruces, 5–6 dm. tall, *Stewart 655*; eastern foothills of Sierra Cruces, 7 mi. north of Santa Elena, rocky bank among bushes, leaves succulent-herbaceous, dark green mottled with terra-cotta, somewhat glaucous, *Johnston & Muller 1012*; west base of Picacho de San José, dry hillside, 8–10 dm. tall, not common, *Stewart 643*; Saltillo, 1880, *Palmer 1307*; battlefield of Buena Vista, 1888, *Pringle 2218* (TYPE). CHIHUAHUA: 6 mi. south of Camargo, leaves with reddish markings, corolla brownish inside, *White 2190*.

The plant has the underground stem erect and much shortened and surrounded by the crowded leaf-bases to form a tunicate bulb. The roots are fleshy tubercles. The leaves are very juicy and neither rigid nor sclerified. They form a flattened basal rosette and have conspicuously mottled blades 1–2 dm. long and 2–3 (–4) cm. wide. The flowers are brownish. The cited

material from Chihuahua differs in having a less well developed bulb in which the old leaf-bases become fibrous, but otherwise it is much like the Coahuilan material.

Agave (*Manfreda*) **planifolia** Wats. Proc. Am. Acad. **22**: 479 (1887).

CHIHUAHUA: Canyon in mountains southwest of Mapula station, warm sandy banks of stream, *Pringle 1141* (TYPE).

The type of this species, cited above, is in fruit. Watson describes the corolla as 18 mm. long with the segments 3-4 times the length of the tube. The leaves are very large and the base of the stem is not bulb-like, but rather is a coarse rhizome clothed with fibrous remnants of old leaves.

Agave (*Manfreda*) **singuliflora** (Wats.) Berger, Die Agaven 31 (1915).

Bravao singuliflora Wats. Proc. Am. Acad. **22**: 479 (1887).

CHIHUAHUA: Cool slopes in mountains just south of Chihuahua, *Pringle 1142* (TYPE).

A plant with a loose tunicate bulb, fleshy roots, and linear leaves. Ranging widely in western Chihuahua.

Agave (*Littaea*) **Lecheguilla** Torr. Bot. Mex. Bound. 213 (April 1859).

Agave Poselgeri Salm-Dyke, Bonplandia **7**: 92 (April 1859).

Agave lophantha var. *Poselgeri* Berger, Die Agaven 93 (1915).

Agave lophantha var. *pallida* Berger, Die Agaven 93 (1915).

VERNACULAR NAME: Lechuguilla.

COAHUILA: Sierra del Pino, *Johnston & Muller 658*; Potrero del Cuervo Chico, *Johnston 8571*; Saltillo, 1898, *Palmer 227*; east of Cienega Grande, May 18, 1847, *Gregg 699*; Jimulco, *Pringle 28*. CHIHUAHUA: Sierra Santa Eulalia, *Pringle 157*; 8 mi. west of Escalon, *White 2064*. ZACATECAS: Cedros, *Kirkwood 8*.

A common and characteristic plant in the limestone areas from western Texas south through our area at least to San Luis Potosi. There is some doubt as to the correct name for this well known species. The two earliest names assigned the species, *A. Lecheguilla* and *A. Poselgeri*, both appear to have been published in April, 1859. Since I have been unable to establish their precise dates, I have accepted the more familiar of the two. *Agave Lecheguilla* was based chiefly upon material collected by Charles Wright near Del Rio and along Devils River, in southern Val Verde County, Texas. *Agave Poselgeri*, given as from the "mexicanischen Hochebene," probably came from near Saltillo or San Luis Potosi, where Poselger is known to have collected cacti and other succulents. *Agave lophantha* var. *pallida* is based upon material from Parras collected by Purpus.

The plant is well known as "Lechuguilla" and is all too common on sunny open mountain-slopes and in the valleys near the mountains. It occurs on clay, but it is most abundant in rocky soils and appears to favor limestone areas. It multiplies by stolons, and a single plant may have its numerous clusters of dagger-like leaves scattered abundantly over as much as 50 square meters. The leaves in especially favorable locations may become 4-5 dm. long, but commonly they are 15-30 cm. in length. Rigid and dagger-like, the leaves are terminated by a formidable spine. Anyone who has been jabbed in the ankle by Lechuguilla and suffered the first sharp pain and, worse, the aching in the ankle-joint which may continue

afterwards for over a week, knows why the plant is a constant hazard to man and beast in the extensive tracts of country where it abounds. It is a much cursed distraction in the peaceful pursuits of plant-collecting; I have suffered more from the spines of *Lechuguilla* than from all the other spiny plants, mosquitoes, and poison "varmin" lumped together. A less human botanist might marvel at the vigor and adaptations which have permitted it to have become such a widespread and successful plant in the deserts of Coahuila, but I can only rank it as a pest and a curse on the country.

Agave (*Littaea*) **univittata** Haw. Philos. Mag. **10**: 415 (1831).

Agave heteracantha Zucc. Act. Acad. Caes. Leop.-Carol. **16**²: 675 (1833).

Agave lophantha Schiede ex Kunth, Enum. **5**: 838 (1850).

COAHUILA: Rancho Agua Dulce, eastern slope of Sierra San Manuel, Wynd & Mueller 380.

A plant of the eastern slopes of the Sierra Madre, from Nuevo Leon southward to the arid portions of the plateau in east-central Mexico. It is closely related to *A. Lechuguilla*, which replaces it in the arid plateau of northern Mexico, differing in its thinner, less rigid, flat, more strap-like, and more elongate leaves, which commonly have an evident median white stripe.

Agave (*Littaea*) **glomeruliflora** (Engelm.) Berger, Hort. Martol. **12** (1912), Die Agaven **93** (1915).

Agave heteracantha forma *glomeruliflora* Engelm. Gard. Chron. II. **19**¹: 48 (1883).

Agave chisosensis Muller, Am. Midl. Nat. **21**: 763 (1939).

VERNACULAR NAME: Maguey de Garcia.

COAHUILA: Sierra de los Guajes, fairly common on hillside, Stewart 1502; Sierra del Pino, single colony of 20-25 plants on rocky hill just below oak-belt, rosettes solitary, 12 in. tall and 15 in. broad, stem 12 ft. tall, less than upper 3 ft. floriferous, Johnston & Muller 711.

This species was based upon material from the Guadalupe Mts. in western Texas. It is evidently allied to *A. Lechuguilla* but differs in its narrowly paniculate rather than spicate inflorescence, the flower-clusters being borne on branches several centimeters long. The leaves appear to average larger and to have coarser lateral thorns than is common in its relative. Possibly it is only a phase of that species.

Agave (*Littaea*) **falcata** Engelm. Trans. Acad. Sci. St. Louis **3**: 304 (1875).

VERNACULAR NAMES: Guapilla, Espadín, Palmita.

COAHUILA: Sierra Guajes, Cañon Madera, east of Buena Vista, hillsides, Stewart 1499; western base of Picacho del Fuste, mountain-side, Johnston 8370; 20 mi. north of Hipolito, dry rocky ridge, Wynd & Mueller 69; Chojo Grande, 27 mi. southeast of Saltillo, 1905, Palmer 716; Buena Vista, 1848, Gregg 299; Gomez Farias, stony slopes, Shreve & Tinkham 9605; Parras, 1880, Palmer 1314; Jimulco, dry hills, Pringle 7. ZACATECAS: Cedros, low ridges, Kirkwood 4.

This species appears to be endemic to our area. It was based upon collections of Wislizenus and Gregg, obtained near Saltillo. It is closely related to *A. striata* Zucc., of Nuevo Leon, San Luis Potosi, and Hidalgo, a plant with very much longer and much more slender leaves, and apparently it replaces that species on the plateau. The leaves of *A. falcata* have a stiff linear falcately curved blade 15-25 cm. long. The dense rosettes grow

in very crowded masses, usually on banks of cemented gravels or limestone ledges. The species seems to be restricted to the eastern parts of the plateau in northern Coahuila. It has not been noted in the Sierra del Pino. It is present on the slopes about Potrero de la Mula, north of Ocampo, and in Charretera Canyon, Sierra Madera, from the mouth of the canyon up to sunny ledges in the oak-belt. Berger, *Die Agaven* 79-80 (1915), reports collections from Hac. Tortuga near Saucedá (*Endlich* 879a), southern slopes of Sierra de la Paila near Marte Station (*Endlich* 879), and Sierra de Parras (*Purpus*).

Agave (*Littaea*) **potrerana** Trel. in Standley, *Contr. U. S. Nat. Herb.* **23**: 138 (1920).

CHIHUAHUA: Potrero Peak, summit of the southern Sierra Santa Eulalia east of Mapula station, *Pringle* 802 (TYPE), 584.

A well-marked species, known only from the type locality. The type collection is *Pringle* 802, not no. "302" as originally cited by Trelease.

Agave (*Littaea*) **parviflora** Torr. *Bot. Mex. Bound.* 214 (1859).

CHIHUAHUA: Dry porphyritic hills 6-12 mi. northwest of Chihuahua, *Pringle* 1995.

A rare species, known only from a few stations in southern Arizona, Sonora, and northern Chihuahua.

Agave (*Littaea*) **Victoriae-reginae** Moore, *Gard. Chron.* II. **4**: 484 (1875).

This species is reported from "Coahuila" by Trelease, *Contr. U. S. Nat. Herb.* **23**: 139 (1920). It is well known from northern Nuevo Leon and is to be expected within Coahuila east of Saltillo and Monclova.

Agave (*Eugave*) **scabra** Salm-Dyck, *Bonplandia* **7**: 86 (1839); Berger, *Die Agaven* 176 (1915).

Agave Wislizeni Engelm. *Trans. Acad. Sci. St. Louis* **3**: 320 (1875); Trel. *Rep. Mo. Bot. Gard.* **22**: 89. *t.* 75-79 (1912).

Agave chihuahuana Trel. *Rep. Mo. Bot. Gard.* **22**: 90. *t.* 82, 83 (1912).

Agave Havardiana Trel. *Rep. Mo. Bot. Gard.* **22**: 91. *t.* 84-86 (1912).

COAHUILA: Caracol Mts. near Monclova, 1880, *Palmer* 1310; Sierra del Pino, along dry ridge crest, *Johnston & Muller* 656. CHIHUAHUA: Sierra Santa Eulalia, north canyon, *Pringle* 22; vicinity of Santa Eulalia, very common, forming large patches on stony mesas and ridges, stems averaging 15 ft. tall, 1908, *Palmer* 138.

Ranging from Coahuila and Chihuahua north to the mountains of western Texas. The type material of *A. scabra* and *A. Wislizeni* is given as from San Sebastian, on the Rio Nazas about 10 km. northeast of Torreon. Trelease refers to the species garden material said to have been distributed from Lampazos, N.L. He cites under *A. chihuahuana* collections from the hills near Chihuahua (*Pringle* 958), from Cusihiuriachic (*Rose* 11654), and from the Sierra Madre of southwestern Chihuahua (*Endlich* 1201). In the United States (under the name *A. Havardiana*) the species is known from the Guadalupe, Davis, Chinati, and Chisos Mountains, Texas. It is a plant of rocky hills and mountain ridges, usually forming colonies. Herbarium material may be difficult to separate from that of *A. asperima*. The latter, however, has larger, more elongate leaves and larger, more branched inflorescences, and is characteristically a plant of the valleys and mountain-bases, where it grows singly or in small colonies. San Sebastian, the type locality given for *A. scabra* and *A. Wislizeni*, is in an area where

A. asperrima is to be expected, rather than the present species. However, since the type material of *A. Wislizeni* does appear really to belong to the present concept, one may wonder if it originated, not at San Sebastian, but rather at Cusihiuriachic, where Wislizenus lived for a number of months and where Rose is reported as having found the species.

Agave (*Euagave*) **parrasana** Berger, Notizbl. Bot. Gart. Berlin **4**: 250 (1906), Die Agaven 176. fig. 58 (1915); Trel. Rep. Mo. Bot. Garden **22**: 90. t. 80, 81 (1912).

A species based upon garden material originally collected in 1905 in the Sierra de Parras by Purpus. A plant with short very broad leaves, conspicuous elongate terminal spine, and very coarse sparse marginal teeth. Illustrations of it suggest plants growing in crowded colonies in dry open pine forests along the highest ridges of the Sierra Madera.

Agave (*Euagave*) **asperrima** Jacobi, Hamb. Gartenzeit. 561 (1864); Mulford, Rep. Mo. Bot. Gard. **7**: 89. t. 53 (1896); Berger, Die Agaven 146 (1915).

Agave Caeciliana Berger, Die Agaven 147 (1915).

VERNACULAR NAMES: Maguey; Maguey cenizo.

COAHUILA: Sierra del Pino, ledges near mouth of southern canyon, *Johnston & Muller* 725; San Lorenzo de la Laguna, 1880, *Palmer* 1309; Jimulco, *Pringle* 158. ZACATECAS: Cedros, *Kirkwood* 9.

This is the widely distributed large gray *Agave* scattered among the desert scrub on valley slopes, usually on somewhat stony soils. It also grows in the mountains, where it is occasional on sunny open brushy flats and slopes in the yucca belt. It appears to be restricted to limestone areas. The large gray rosettes may be solitary or, less frequently, in especially favorable places, grouped to form patches of the plant several meters in extent. The flowering shoots commonly reach about 5 m. in height.

The species was based upon garden material said to have been collected by Lindheimer in Texas. In Texas it has been collected near El Paso, in the Big Bend, and along the southern escarpment of the Edwards Plateau. Berger, l.c., reports collections from the Sierra de la Paila, and from San Pedro, Viesca, and Jimulco.

IRIDACEAE

Sisyrinchium Shaffneri Wats. Proc. Am. Acad. **18**: 160 (1883).

Hydrastylus parvus Bicknell, Bull. Torr. Bot. Cl. **27**: 384 (1900).

COAHUILA: Saltillo, along water-courses, fl. yellow, 1898, *Palmer* 157; Saltillo, low valley, 1847, *Gregg* 340 (isotype of *H. parvus*).

Ranging from central Mexico north into Coahuila and Chihuahua. The plant tends to stain collecting papers purplish. It has a loosely forking rhizome.

Sisyrinchium tenuifolium H. & B. ex Willd. Hort. Berol. t. 92 (1809).

COAHUILA: Tableland north of Cañon del Cuervo Chico, thin soil at base of low rounded limestone hills, common, *Johnston* 8568; Lirios, 1880, *Palmer* 1301.

Ranging from Guatemala north to Coahuila and Chihuahua.

Sisyrinchium aff. **arizonicum** Rothr. Bot. Gaz. **2**: 125 (1877).

CHIHUAHUA: Sunny open hillsides about the high valleys at the northwest end of the Sierra Diablo, not common, *Stewart* 966.

The plant cited differs from *S. arizonicum* in having much more slender glaucescent stems and leaves, inconspicuously ribbed leaves, and much smaller spathes. Perhaps it may be more closely related to *S. tenuifolium* or may even be a vigorous form of it.

***Sisyrinchium* sp.**

VERNACULAR NAME: Purole.

COAHUILA: Sierra del Carmen, Cañon Sentenela, Wynd & Mueller 528; Hillcoat Canyon, west of Buena Vista Ranch, July 13, 1938, Marsh 1316; Sierra Encantada west of Rancho Buena Vista, crest of high ridge, Stewart 1456; Muzquiz, Marsh 1071, 2130; Sierra Gloria, Marsh 1942; battlefield near Buena Vista, Gregg 70; Lirios, 1880, Palmer 2007; Carneros Pass, Pringle 5074; 22 km. northwest of Fraile, mountain valley, Stanford et al. 465; 26 km. northwest of Fraile, top of mountain, Stanford et al. 446; Sierra Hechiceros, Cañon Indio Felipe, wet sand near stream, Stewart 115; Sierra del Pino, near La Noria, gravelly bench along arroyo, Johnston & Muller 499; Sierra Madera, main ridge east of Picacho de Zozaya, high open ridge crest, Johnston 9016. CHIHUAHUA: San Pablo, Rio San Pedro, marsh, April 29, 1847, Gregg 539; Sierra Diablo, in meadow in high valleys at northwest end of range, Stewart 1005.

Cited above is material of blue-flowered perennial species belonging to the complex which in Mexico is generally called *S. scabrum* C. & S. Several species may be represented. Some of the specimens closely resemble named forms from western Texas and others resemble in varying degrees plants from central Mexico.

***Nemastylis Pringlei* Wats. Proc. Am. Acad. 24: 85 (1889).**

CHIHUAHUA: Southern foothills of the Sierra Hechiceros near El Tule, wet rocky hillside, Stewart 498.

Ranging along the western Sierra Madre from Durango north into Arizona. The species of *Nemastylis* here mentioned were identified by Dr. R. C. Foster.

***Nemastylis tenuis* (Baker) Benth. ex Baker, Handb. Irid. 112 (1892).**

COAHUILA: Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, Marsh 1467.

Trans-Pecos Texas south to central Mexico.

***Iris missouriensis* Nutt. Jour. Acad. Nat. Sci. Phila. 7: 58 (1834).**

COAHUILA: Lirios, 1880, Palmer 1302.

This species ranges widely in the western United States east to Montana, Colorado, and New Mexico and approaches the Mexican boundary only in southeastern Arizona. If Palmer found the plant growing wild at Lirios, in the Sierra Madre near the Nuevo Leon boundary about 40 km. east of Saltillo, then his specimens represent a remarkable outlying station for the species. It has not since been discovered in Mexico nor at such an easterly point. At Lirios, however, Palmer collected another *Iris* (no. 2009) representing one of the showy European species which must have come from a garden or from plants escaped from cultivation. Possibly Palmer's material of *I. missouriensis* may have also come from plants either in a garden or escaped from it. It is difficult, however, to imagine the circumstance under which this *Iris* of the western United States could have reached a garden in the remote valley in the Sierra Madre where Palmer collected it.

ORCHIDACEAE

(Identifications by L. O. WILLIAMS)

Govenia sp.COAHUILA: Sierra de la Gloria, Aug. 6, 1939, *Marsh* 2204.

The specimen from the Sierra Gloria is sterile but is probably conspecific with the material obtained by Pringle (no. 2794) in cool rich canyons in the Sierra Madre near Monterey. Pringle's collection is the type of *G. elliptica* Wats., a species now considered a synonym of *G. pauciflora* Lindley. A *Govenia*, probably the same species, is also present in the Sierra Madera. The coarse rosettes of broad leaves, assumed to be this orchid, are frequent on the moist shady slopes in the conifer forests, below the highest crests, in Charretera Canyon. No flowers nor even weathered old fruiting stems were observed in September.

Corallorrhiza elliptica Schlechter, Beih. Bot. Centralbl. **36**²: 410 (1918).COAHUILA: Muzquiz, 1936, *Marsh* 1062.

A poorly understood species known also from Chihuahua. Perhaps also referable here are *Corallorrhizae* collected in the Sierra del Carmen, Sept. 12, 1936, *Marsh* 635, and in the Sierra Madera in damp shaded coniferous forests in Cañon Charretera, *Johnston* 9008 and 9051.

Hexalectris grandiflora (Rich. & Gal.) L. O. Williams, comb. nov.*Corallorrhiza grandiflora* Richard & Gal. Ann. Sci. Nat. III. **3**: 19 (1845).*Hexalectris mexicana* Greenm. Proc. Am. Acad. **39**: 77 (1903).

COAHUILA: Sierra del Carmen, Cañon Sentenela, *Wynd & Mueller* 530; Hillcoat Mesa, west of Encantada Ranch, July 25, 1938, *Marsh* 2274; Sierra del Pino, occasional in pine forest, *Johnston & Muller* 529; Sierra Madera, Cañon Charretera, deep leaf mulch in moist shaded canyon in pine forests, *Johnston* 8989; Carneros Pass area, July 1880, *Palmer* 2006; mountains northwest of Fraile, *Stanford et al.* 460.

Known from the Big Bend area in Texas, and from Chihuahua, Coahuila, Nuevo Leon, San Luis Potosi, Michoacan, Puebla, and Oaxaca.

Hexalectris nitida L. O. Williams, sp. nov.

Herbae saprophyticae simplices erectae efoliosae usque ad 3 dm. altae; sepalum dorsale elliptico-oblongum; sepala lateralía elliptico-oblonga obtusa arcuata; petala elliptico-oblongeolata obtusa arcuata; labellum elliptico-ovatum trilobatum; columna generis.

Stems slender, with several short cauline bracts; inflorescence several-flowered, the flowers opening one at a time, the bracts 3–6 mm. long, elliptic-ovate, cucullate; dorsal sepal ca. 11 mm. long and 3.5–4 mm. broad, obtuse; lateral sepals 9–10 mm. long and 3.5–4 mm. broad; petals ca. 10 mm. long and 3.5 mm. broad, 3-nerved with the nerves branched; lip 8–9 mm. long and 6–6.5 mm. broad; lateral lobes of lip ca. 6 mm. long from base of lip, not reaching to apex of the mid-lobe, subovate, obtuse; mid-lobe 3–4 mm. long and 3–3.5 mm. broad, obovate to suborbicular or subquadrate, truncate; lamina of lip with several carinate ridges extending down center and onto the lobes; column ca. 6.5–7 mm. long; pollinia 8, 4 in each cell of anther.

COAHUILA: Sierra Mojada, Cañon de Hidalgo, shaded canyon below crest at top of canyon, erect, among rocks, not common, Aug. 4, 1941, *R. M. Stewart* 1068 (TYPE, Gray Herb.).

A species to be associated with *H. parviflora* L. O. Williams and sharing with it the distinction of having the smallest flowers known in the genus. From that species it is readily distinguished by the shape of its petals and lip.

Spiranthes rubricallosa Robins. & Greenm. *Am. Jour. Sci.* **50**: 165 (1895).

COAHUILA: Sierra Madera, moist shaded pine forest, among moss, along the high crest east of Picacho Zozaya, rare, *Johnston* 9024.

Otherwise known from single collections from Chihuahua, Nuevo Leon, and Puebla.

Spiranthes michuacana (Llav. & Lex.) Hemsl. *Biol. Centr. Am. Bot.* **3**: 301 (1884).

CHIHUAHUA: Hills near Chihuahua, Oct. 1885, *Pringle* 521.

Ranging from Chiapas north through Durango, Sonora, and Chihuahua to southeastern Arizona; also in the Chinati Mts. of trans-Pecos Texas.

Spiranthes durangensis Ames & Schweinf. *Bot. Mus. Leaflet. Harvard* **3**: 128 (1935).

Spiranthes saltensis Ames, *Orchid.* **2**: 258 (1908); non Griseb. (1879).

This species has been collected on cliffs near the Rio Grande in the Big Bend area of Texas and may be expected in our area. It is otherwise known only from Nuevo Leon, Durango, San Luis Potosi, and Federal District.

Spiranthes cinnabarina (Llav. & Lex.) Hemsl. *Biol. Centr. Am. Bot.* **3**: 300 (1884).

VERNACULAR NAME: Lirio.

COAHUILA: Sierra del Carmen, Sept. 1, 1936, *Marsh* 623; Hillcoat Mesa west of Encantada Ranch, July 25, 1938, *Marsh* 2268; Sierra Guajes, Cañon Milagro, west of Encantada Ranch, common on hillsides about mouth of canyon, *Stewart* 1541; Caracol Mt., Aug. 1880, *Palmer*; Sierra Gavia, 5 mi. north of Saucillo, hillside, *Johnston* 7221; Puerto San Lazaro, rare on rocky shrubby slopes, *Muller* 3054; Chojo Grande, 27 mi. southeast of Saltillo, gravelly openings in canyon, scarce, 1904, *Palmer* 370; Sierra del Pino, among rocks at head of great western escarpment, about 10 mi. north of La Noria, *Johnston & Muller* 545; Cañon del Cuervo Chico, among Lechuguilla on limestone ridge at head of canyon, not common, *Johnston* 8524; Picacho de San José, dry limestone hillside, *Stewart* 1105; Sierra Mojada, Cañon Hidalgo, canyon below crest, *Stewart* 1064; Sierra de Parras, south of Parras, *Shreve & Tinkham* 9871; Sierra de Parras, Oct. 1910, *Purpus* 4690. CHIHUAHUA: Sierra Santa Eulalia, 1885, *Pringle* 632; Sierra Diablo, canyons and high valley at northern end of range, *Stewart* 893, 976.

Ranging from the Big Bend area in Texas south through our area, San Luis Potosi, and Hidalgo to the drier parts of central and southern Mexico and adjoining Guatemala. An attractive plant, with a conspicuous orange-red flower-cluster, which, though seldom common, is widely distributed in our area on open slopes and ridges in arid rocky limestone soils, commonly in the company of Lechuguilla. Its habit may be an unconventional one for an orchid, but anyone who has tried to dry specimens of the plant without continued artificial heat can appreciate its ability to retain its moisture under desert conditions.

Habenaria limosa (Lindl.) Hemsl. *Biol. Centr. Am. Bot.* **3**: 305 (1884).

COAHUILA: Carneros Pass area, Aug. 1880, *Palmer*; mountains near Carneros Pass, Sept. 15, 1889, *Pringle* 2828.

Known from Arizona and New Mexico and from Sonora, Coahuila, and Nuevo Leon; south to Guatemala.

Habenaria brevifolia Greene, Bot. Gaz. **6**: 218 (1881).

COAHUILA: Sierra Madera, Cañon del Agua, leaf-mold in moist oak-maple forest, *Muller 3224*; Sierra Madera, La Pipa fork of Charretera Canyon, moist shady conifer forest, *Johnston 9007, 9007a*; Sierra Madera, rocky open pine forest of high crest east of Picacho de Zozaya, *Johnston 9025*.

Known from New Mexico, Chihuahua, Coahuila, Nuevo Leon, Tamaulipas, and south to Oaxaca.

Malaxis fastigiata (Reichenb. f.) Kuntze, Rev. Gen. **2**: 673 (1891).

COAHUILA: Caracol Mt., Aug. 1880, *Palmer 1300*.

Known from Arizona and New Mexico, and from Chihuahua, Coahuila, and Nuevo Leon; south to Costa Rica.

Malaxis Ehrenbergii (Reichenb. f.) Kuntze, Rev. Gen. **2**: 673 (1891).

COAHUILA: Sierra del Carmen, Sept. 15, 1936, *Marsh 560a*; Sierra del Pino, high eastern ridge, one plant in rich shady soil, fl. purple, *Stewart 2290*; Sierra Madera, Cañon del Agua, dense pine-oak forest on steep slope, sparse, *Muller 3211*; Sierra Madera, Corte Blanco fork of Charretera Canyon, local in deep leaf-mulch under oaks in deep moist shaded ravine at lower edge of pine-belt, *Johnston 8982*; mountains northwest of Fraile, *Stanford et al. 407*.

Ranging from New Mexico and Arizona south through Coahuila and Chihuahua to Guatemala.

Malaxis Soulei L. O. Williams, Ann. Mo. Bot. Gard. **21**: 343 (1934).

COAHUILA: Sierra Madera, Corte Blanco fork of Charretera Canyon, local in deep leaf-mulch under oaks in deep moist shaded ravine at lower edge of pine belt, growing with *M. Ehrenbergii*, *Johnston 8981*. CHIHUAHUA: Canyon in Mapula Mts., cool slopes, Nov. 4, 1886, *Pringle*.

Western Texas (Davis Mts.) to Arizona south through Nuevo Leon, Coahuila, and Chihuahua to Panama.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

A NEW COMBINATION IN ASIMINA

ALFRED REHDER AND WILLIAM A. DAYTON

Asimina pulchella (Small) comb. nov.

Deeringothamnus pulchellus Small in Bull. Torrey Bot. Club **51**: 390 (1924).

Asimina pulchella (Small) G. A. Zimmermann in Jour. Hered. **32**: 89 (1941) "*A. pulchellus*"; nomen. — Kelsey & Dayton, Standard. Pl. Names, ed. 2, 24, 257, 468 (1942), nomen.

The genus *Deeringothamnus*, typified by his *D. pulchellus*, was proposed by the late Dr. John K. Small in 1924, being separated from *Asimina* by "the dimorphous stems, the flat or depressed receptacle, and the narrow nearly uniform unsculptured petals." Later (in *Addisonia* **15**: 17, 1930), Small transferred *Asimina Rugelii* Robins. to *Deeringothamnus*. Both species are shrubs of the Florida flatwoods, not over 2 ft. high, with fusiform roots, persistent aromatic leaves, very fragrant flowers, and linear petals.

It seems probable that the majority of botanists, as well as horticulturists and other workers with plants, will prefer to regard these two dwarf pawpaws as belonging to the genus *Asimina*, since the characters by which Small separated *Deeringothamnus* do not seem to be important enough for generic distinction. They were treated as species of *Asimina* in the *Journal of Heredity* (l.c.) by the late Dr. G. A. Zimmermann of Harrisburg, Pennsylvania, probably the outstanding American authority on the horticulture and genetics of this genus, as well as by Kelsey and Dayton in their *Standardized Plant Names* (l.c.). Miss Doris W. Hayes, of the U. S. Forest Service, who has in manuscript a proposed publication on the records of the Edison Botanic Research Corporation, informs us that the late Thomas A. Edison, in his researches on native United States plants as possible sources of emergency rubber, made three routine chemical tests of *Asimina pulchella* but with negative results. Unfortunately, use of the combination *Asimina pulchella* has hitherto been illegitimate, the requirements of Art. 44(2) of the International Rules not having previously been met.

Small's type of *Deeringothamnus pulchellus* was collected by him in 1923 "in the uninhabited wilderness between Punta Gorda and Fort Myers," De Soto County, Florida. This would appear to be in what is now known either as Charlotte or Lee Counties. Harold N. Moldenke collected the species (*Moldenke 930*) on Big Pine Island, Lee County, Florida, in 1930. Miss Hayes advises us that the Edison collection above referred to was made in the spring of 1928 near Fort Myers, Lee County, Florida, by unspecified collector(s) of the Edison Botanic Research Corporation.

THE PHILIPPINE, CHINESE, AND INDO-CHINESE SPECIES OF THE GRASS GENUS GARNOTIA BRONGNIART¹

JOSÉ VERA SANTOS

With two plates and one text-figure

THE original plan of the writer was to make a critical study of all the species of *Garnotia* and to prepare a monograph of the genus. The presence of several polymorphic species, however, demands a more intensive investigation of a larger number of collections than available at present and, especially, a careful study of the type specimens. The species are so extremely variable that it is impossible to define them accurately without access to additional material. The variations include primarily the great diversity in the size and pubescence of the leaves and in the length and insertion of the awns of the spikelets. Thirty-eight species and seven varieties have been described. The type specimens of 11 of these are in the segregated type collections of the U. S. National Herbarium, which are not accessible for the duration of the war. Since it is impossible to borrow specimens from foreign herbaria or to visit them, it is necessary to confine the present work to the species of the Philippines, China, and Indo-China, from whence there is sufficient material available for study. All accessible types, duplicate types, or topotypes of the species treated in this paper were examined. In all cases the original descriptions were consulted. The present treatment includes eight species and two varieties, of which three species and one variety are described as new.

This study is based on the collections in the U. S. National Herbarium, supplemented by specimens borrowed from other institutions. The following abbreviations are used in designating the herbaria in which the cited specimens are deposited: (NH) United States National Herbarium, (NY) Britton Herbarium of New York Botanical Garden, (G) Gray Herbarium of Harvard University, (UM) Herbarium of the University of Michigan, (UC) Herbarium of the University of California, and (AS) Herbarium of the National Research Institute of Biology, Academia Sinica, Nanking, China.

The author expresses his gratitude to Agnes Chase for her encouragement and guidance during the course of this study. Grateful acknowledgement is also due Jason R. Swallen for his assistance, and to Dr. William R. Maxon for his kind coöperation in extending to the writer the facilities of the U. S. National Herbarium and for borrowing specimens from other herbaria.

SYNONYMY AND RELATIONSHIPS

Garnotia Brongn. in Duperrey, M. L. I., Voyage Autour du Monde

¹Papers from the Department of Botany of the University of Michigan, no. 732.

2(2): 133. *pl.* 21. 1830. The genus and a single species, *G. stricta* Brongn., are described and figured with a full-page illustration showing the habit of a flowering plant and the structure of the spikelet.

Miquelia W.-Arn. & Nees, Nov. Act. Acad. Caes. Leop. Carol. Nat. Cur. **19**: Suppl. 1: 177. 1841. A generic description is given and three species are included: *M. barbulata* Nees (p. 178), *M. Emodi* W.-Arn. & Nees (p. 178), and *M. courtallensis* W.-Arn. & Nees (p. 179). The incomplete diagnosis of *M. barbulata* must have been based on fragmentary material, for in presenting the structure of the spikelet, the first glume was described, then it was stated that "Reliquas partes fructificationis explicare non potui." Since no collection was cited, it seems best to consider this as a *species dubia* until it is interpreted by an adequate specimen. In *M. Emodi*, the straight, erect awn of the lemma is a deviation from the generic description which specifies that the short-bidentate apex of the lemma "emittens aristam (setam) infra medium geniculatam et tortilem." *M. courtallensis*, the last species, agrees well with the generic description, hence it is taken as the type species.

There is no indication that Walker-Arnott and Nees were aware of *Garnotia* Brongn. when they described *Miquelia*, for no reference was made to it. An analysis of the description of *Miquelia* W.-Arn. & Nees shows that its characters agree with those of *Garnotia* Brongn. The transfer to *Garnotia* of the three species originally described under *Miquelia* is clearly justified: *G. barbulata* (Nees) Merr. Philip. Jour. Sci. Bot. **13**: 130. 1918, *G. Emodi* (W.-Arn. & Nees) Janowski in Mez, Repert. Sp. Nov. **17**: 86. 1921, and *G. courtallensis* (W.-Arn. & Nees) Thwaites, Enum. Pl. Zeyl. 363. 1864. *Garnotia barbulata*, however, must be considered temporarily as a *species dubia*. Dr. Keng refers it doubtfully to *Arundinella setosa* Trin. as a synonym.²

Berghausia Endl. Gen. Pl. Suppl. **3**: 57. 1843. "*Miquelia* Nees in Plant. Meyen. 177," the only citation, refers to a specimen, not to a publication. The generic description agrees well with that of *Miquelia* W.-Arn. & Nees. No species were here transferred by Endlicher. Probably unaware of *Garnotia* Brongn., Endlicher must have proposed the genus *Berghausia* on the ground that the name *Miquelia* had been previously applied to two other genera, *Miquelia* Meissn. Gen. 152. 1838, and *Miquelia* Blume, Bull. Neerl. **1**: 94. 1838. Since the publication of *Berghausia* Endl. involves only a change in nomenclature, maintaining the generic concept of *Miquelia* W.-Arn. & Nees, the type species of *Miquelia*, *M. courtallensis* W.-Arn. & Nees, is retained for *Berghausia* Endl. Following the concept of Endlicher, Miquel³ published six species of *Berghausia*, each of which was based on a species of *Miquelia*. Endlicher is given as the author of *B. barbulata*, *B. Emodi*, and *B. courtallensis*. All the species published under *Berghausia* have been transferred to *Garnotia* Brongn.

²Keng, Y. L., Nat. Cent. Univ. Science Reports, Biology **2**: 56. 1936.

³Miquel, F. A. G., Verh. Nederl. Inst. III. **4**: 32. 1851.

In 1855 Steudel⁴ recognized *Garnotia*, but at the same time he considered *Miquelia* W.-Arn. & Nees as a separate genus with *Berghausia* Endl. as a synonym. The first treatment of *Garnotia* as it is now accepted is that of Bentham,⁵ who considered it as a valid genus with both *Miquelia* W.-Arn. & Nees and *Berghausia* Endl. as synonyms. Following Bentham's treatment, the genus was similarly recognized in the floristic studies of Asia, among the most prominent of which are those by Thwaites,⁶ Hooker,⁷ Trimen and Hooker,⁸ Cook,⁹ Merrill,¹⁰ and Ridley.¹¹

The 1-flowered spikelets, subterete to dorsally compressed, and disarticulating below the glumes, misled the earlier authors as to the taxonomic position of the genus. Brongniart states that it is near *Paspalum*; Walker-Arnott and Nees place it in Tristegineae, and Endlicher in Paniceae. Steudel places both *Garnotia* and *Miquelia* in Paniceae. Bentham places *Garnotia* in Tristegineae. Thwaites does not indicate the tribes but places *Garnotia* next after *Arundinella* Raddi. Hooker was the first to recognize the affinity of *Garnotia*, in spite of its anomalous characters, placing it in Agrostideae, and he has been followed by subsequent authors.

GARNOTIA Brongn.

Spikelets 1-flowered, lanceolate to narrow-lanceolate, subterete to dorsally compressed, disarticulating below the glumes, pubescent at the base, solitary or in pairs, the members of each pair with unequal (usually short) pedicels; rachilla not produced behind the palea; glumes often rigid, unequal, acute to acuminate, awned or awnless, 3-nerved, the nerves scabrous to scabrous; lemma firm or membranous, 1- or 3-nerved, awned (rarely awnless) from the entire, notched, or bidentate apex, the awn slender, erect, straight, flexuous, bent, or geniculate and twisted toward the base, or tortuous toward the tip; palea membranous, enclosing a bisexual flower, faintly 2-nerved, keeled along the nerves, the margins auricled below the middle; lodicules 2, minute, glabrous or fimbriate.

Annual or perennial grasses with simple or branched culms, flat or involute blades, and open to contracted panicles.

TYPE SPECIES: *G. stricta* Brongn. Described from Tahiti.

This species has been repeatedly reported in floras of several regions in Asia and the islands of the Pacific. During the preparation of this paper, an intensive study was made of the numerous specimens from the regions mentioned which had been determined as *G. stricta*. The writer, guided by the original description and plate of Brongniart, came to the conclusion that the only collections which represent the species are those of Peter

⁴Steudel, E. G., Syn. Pl. Gram. 119. 1854, Add. et Emend. 417. 1855.

⁵Bentham, G., Fl. Hongk. 416. 1861.

⁶Thwaites, G., Enum. Pl. Zeyl. 363. 1864.

⁷Hooker, J. D., Fl. Brit. Ind. 7: 241. 1896.

⁸Trimen and Hooker, Handb. Fl. Ceyl. 5: 253. 1900.

⁹Cook, T., Fl. Pres. Bomb. 2: 1012. 1908.

¹⁰Merrill, E. D., Enum. Philip. Fl. Pl. 1: 81. 1925.

¹¹Ridley, H., Fl. Malay Pen. 5: 242. 1925.

Nelson (359 and 430) from the island of Guam. Of the six collections from the Philippines cited by Merrill¹² as belonging to *G. stricta*, the following duplicates were examined: *Elmer* 6210 and 6989; *Merrill* 3903, 4716, and 5484. Careful study of the specimens shows that none of them can be identified as *G. stricta*. Merrill¹² himself stated that, "The Philippine form of *Garnotia* may represent a distinct species, characterized specially by the long-awned flowering glume."

Garnotia is distributed from eastern and southern Asia to the Pacific Islands, at low to high altitudes. There are about 30 species, three from the Philippines, five from China, three from Indo-China, and the rest from the other localities of its range.

KEY TO THE SPECIES AND VARIETIES

- A. Lemma long-awned.
 - B. Awn of lemma geniculate, twisted below the bend.
 - C. Glumes papillose-pilose1. *G. ciliata*.
 - CC. Glumes glabrous.
 - D. Mature blades conduplicate, falcate to subarcuate.1a. *G. ciliata* var. *conduplicata*.
 - DD. Mature blades flat.2. *G. fragilis*.
- BB. Awn of lemma erect, not twisted.
 - C. Branches of mature panicles stiffly spreading.3. *G. patula*.
 - CC. Branches of mature panicles loosely appressed or sometimes strict.
 - D. Both glumes long-awned, the awn 3-5 mm. long.
 - E. Culms erect, 20-40 cm. tall.4. *G. trisetia*.
 - EE. Culms decumbent, rooting at the lower nodes, 45-90 cm. tall.4a. *G. trisetia* var. *decumbens*.
 - DD. Both glumes short-awned to awnless, rarely one glume long-awned.
 - E. Awn of lemma stiff, straight to weakly flexuous from the base to the tip.5. *G. caespitosa*.
 - EE. Awn of lemma stiff, straight to weakly flexuous to above the middle, capillary, strongly flexuous or tortuous, usually drooping toward the tip, the tortuous part sometimes deciduous at maturity.6. *G. mindanaensis*.
- AA. Lemma awnless.
 - B. Branches of mature panicles spreading, the pairs of spikelets distant.7. *G. mutica*.
 - BB. Branches of mature panicles loosely appressed, the pairs of spikelets approximate.8. *G. philippinensis*.

1. *Garnotia ciliata* Merr. Philip. Jour. Sci. Bot. 13: 130. 1918.

Perennial, 25-40 cm. tall; culms usually ascending from a decumbent base, sometimes rooting at the lower nodes, glabrous, the nodes pubescent; sheaths papillose-pilose, mostly longer than the internodes; collar glabrous or nearly so; ligule about 0.5 mm. long, the margin minutely erose, ciliate; blades 8-11 cm. long, 5-8 mm. wide, flat, narrow-lanceolate, acuminate, tuberculate-pilose with long hairs on both surfaces, the margins wavy, scaberulous and tuberculate-ciliate; panicles to 13 cm. long, occasionally longer; branches strict, up to 6 cm. long, in fascicles or those near the summit paired to solitary; spikelets dorsally compressed, about 6 mm. long and 1 mm. wide, narrow-lanceolate, bearded around the base, in pairs, the short, unequal pedicels angular, scaberulous; glumes equal or subequal,

¹²Merrill, E. D., Philip. Jour. Sci. Bot. 1: Suppl. 374. 1906.

acuminate, short-awned, sparsely pilose with long, soft hairs; lemma slightly shorter than the glumes, narrow-lanceolate, hyaline, glabrous, faintly 1- to 3-nerved, awned from the bidentate apex, the awn about twice as long as the spikelet, geniculate near the base, twisted, smooth, brown below the bend, the rest straight, scaberulous, pale; palea shorter than the lemma, narrow, the margins auricled toward the base, sparsely puberulent from the auricles to the tip; lodicules membranous, cuneate, glabrous.

TYPE AND LOCALITY: "Loh Fau Mountain (Lofaushan), *Merrill* 10701, August 25, 1917, on thin earth over boulders along streams, altitude 900 to 1,000 meters."

CHINA: Kwangtung: Loh Fau Mountain, roadside, *McClure & Levine* (Cant. Christ. Coll. no. 6928), Aug. 31 - Sept. 4, 1921 (NH; G, photograph only); moist place on rocks near summit, *Hitchcock* 19009, Oct. 26-29, 1921, taller plant with broader and longer leaves (NH).

1a. *Garnotia ciliata* Merr. var. *conduplicata* var. nov.

Annua; vaginae papilloso-pilosae; laminae ad maturitatem conduplicatae, falcatae vel subarcuatae; paniculae usque ad 15 cm. longae; spiculae eis speciei similes sed glabrae.

Annual; culms erect or ascending; sheaths papillose-pilose, the hairs mostly deciduous; blades at maturity conduplicate, falcate to subarcuate, with hairs similar to those of the sheaths; panicles up to 15 cm. long, the branches strict; spikelets about 5 mm. long, similar to those of the species but glabrous.

TYPE in the U. S. National Herbarium, no. 1106724, collected on moist place on rocks near the summit of Loh Fau Mountain, Kwangtung, China, Oct. 26-29, 1921, by A. S. Hitchcock, no. 19009½. Another specimen from Kwangtung is Cant. Christ. Coll. no. 10547, Oct. 28, 1921 (NH). No collector nor particular locality is indicated.

The habit is identical with that of the species but the variety differs in that most of the hairs of the leaves are deciduous, leaving the papillae only; the mature blades are conduplicate, falcate to subarcuate, and the spikelets are glabrous.

2. *Garnotia fragilis* sp. nov. PLATE I.

Annua; culmi simplices vel pauciramosi, nodis pubescentibus; vaginae compressae, carinatae, non crebrae; laminae 6-15 cm. longae, 5-12 mm. latae, planae, utrinque papilloso-pilosae; paniculae laxae, saepe fragiles, infirme flexuosae; spiculae e dorso compressae, 3-4 mm. longae, 0.5-0.6 mm. latae; lemma pallidum, anguste lanceolatum, glabrum, 1-nerve, inter lobos aristatum, arista lemmate 2-3-plo longiore, geniculata, infra geniculum torta.

Annual; culms up to 36 cm. tall, sparingly branched, erect or sometimes ascending and rooting at the lower nodes, glabrous, the nodes pubescent; sheaths compressed, keeled, sometimes sparsely ciliate along the margins, otherwise glabrous; collar glabrous; ligule about 0.5 mm. long, membranous, ciliate; blades of the basal leaves much reduced, those of the upper 6-15 cm. long, 5-12 mm. wide, flat, narrow-lanceolate, acute to acuminate, sparsely papillose-pilose on both surfaces, the hairs on the upper surface near the ligule about 4 mm. long, the nerves and the wavy margins weakly scaberulous, the bases usually narrow; panicles lax, partly included in the uppermost sheaths, interrupted toward the base; main axis angled, scabrous; branches up to 7 cm. long, often fragile, weakly flexuous, ascending or loosely appressed, fascicled at the lower nodes, paired to solitary toward

the tip; spikelets dorsally compressed, 3–4 mm. long, 0.5–0.6 mm. wide, narrow-lanceolate, pubescent at the base, in pairs, the unequal pedicels about $\frac{1}{4}$ and $\frac{1}{2}$ – $\frac{3}{4}$ as long as the spikelets respectively; first glume slightly shorter than the second, both scaberulous on the nerves, sparsely so on the internerves, awned from the notched or shortly bidentate apices, the awns up to $\frac{1}{2}$ as long as the glumes, the awn of the first glume usually slightly shorter than that of the second; lemma pale, equaling the second glume, narrow-lanceolate, glabrous, faintly 1-nerved, the margins hyaline, awned from the bilobed apex, the lobes narrow, obtuse, the awn 2–3 times as long as the lemma, sometimes longer, geniculate toward the base, brown and twisted below the bend, the rest lighter in color, straight to weakly flexuous, antrorsely scaberulous; palea much shorter than the lemma, membranous, the margins auricled toward the base, sparsely soft-pubescent from the auricles to the tip; lodicules cuneate, glabrous.

TYPE in the U. S. National Herbarium, no. 1610035, collected along a path through humid forest at an elevation of about 2000 meters, in the vicinity of Chapa, Lo Qui Ho, Indo-China, September, 1933, by A. Pételot, no. 4745. A duplicate type is in the Britton Herbarium, New York Botanical Garden, and another is in the possession of the writer, to be deposited in the herbarium of the University of the Philippines, Manila. A. Pételot 5058 (NH) and 5068 (NH, NY), collected from the type locality and its vicinity, also belong to this species.

The specific epithet alludes to the characteristic fragility of the branches of the panicles, which break off easily.

While this species shows affinity to the Indian *Garnotia polypogonoides* Munro,¹³ it is distinguished from that by the following characters: culms sparingly branched; basal sheaths not crowded and overlapping, the blades papillose-pilose on both surfaces; panicles lax, partly included in the uppermost sheaths, the branches often fragile, weakly flexuous; mature lemma pale.

3. *Garnotia patula* (Munro) Benth. Fl. Hongk. 416. 1861.

Berghausia patula Munro, Proc. Amer. Acad. 4: 362. 1860.

Garnotia drymeia Hance, Ann. Sci. Nat. IV, Bot. 18: 233. 1862. Described from Hongkong (Hance Herb. propr. no. 8668), collector not given.

Garnotia Poilanei A. Camus, Bull. Mus. Hist. Nat. Paris 27: 456. 1921. Described from Cambodia, *Poilane* 271.

Perennial; culms 30–80 cm. tall, tufted, erect, simple, glabrous, the nodes glabrous to short-pubescent; leaves mostly basal; sheaths glabrous to sparsely pilose; collar densely pubescent; ligule membranous, 0.2–0.5 mm. long, ciliate to pilose; blades 15–40 cm. long, 4–12 mm. wide, linear-lanceolate, acute to acuminate, glabrous to sparsely tuberculate-pilose, the margins weakly scabrous; panicles compound, 15–40 cm. long, the branches stiff, widely spreading, as much as 11 cm. long, fascicled toward the base, paired to solitary toward the summit; spikelets dorsally compressed, 4–4.5 mm. long, lanceolate to narrow-lanceolate, pubescent around the base, in pairs, one pedicel short, the other up to about as long as the spikelet; glumes equaling the spikelets, acute to acuminate, short-awned or sometimes long-awned, the nerves scaberulous; lemma as long as the glumes, glabrous, 3-nerved, acuminate, awned, the awn 7–13 mm. long, weakly scabrous, straight or slightly wavy; palea membranous, the margins auricled toward

¹³Munro ex Oliver in Hook. Icon. Pl. 5: 64. pl. 1484. 1885.

the base, soft-pubescent from above the auricles to the tip; lodicules spatulate-cuneate, glabrous.

TYPE AND LOCALITY: "Hong Kong." Collected by Charles Wright (U. S. North Pac. Expl. Exped. 1853-56). No collector's number given.

CHINA: Kwangsi: Po Yam Shan (along Kwangtung border), near Tai Chung village (Sun-to District), *Tsang* 22968, Oct. 12, 1933 (G); Tou Ngok Shan (along Kwangtung border), near Tung Chung village (Waitsap District), *Tsang* 23271, Nov. 24, 1923 (G); Se Tze Shan (along Kwangtung border), near Tung Chung village (Waitsap District), *Tsang* 23326, Dec. 4-6, 1933 (G); Kwangtung: Loh Fau Mountain, 20 miles north of Sheklung, in moist place on rock slide above monastery, *Hitchcock* 19049, Oct. 26-29, 1921 (NH); Canton, White Cloud Mountain and vicinity, along small stream, *Hitchcock* 18909, Oct. 24, 1921 (NH); above Canton, at summit of Pakwan Mountain, Hance Herb. no. 9668, Oct. 8, 1869, collector not indicated (G); Hainan, *Chow* 73545, 1935, an exceptionally tall and robust plant (G); opening in woods on Kachek River 25 miles above Kachek, *Hitchcock* 19628, Oct. 13, 1921 (NH); Hongkong: *Wright* (U. S. North Pac. Expl. Exped.), 1853-56 (G, ISOTYPE); Hance Herb. no. 1009, Oct. 1859, no collector given (G); Road to Victoria Peak, shady slope below hotel, *Hitchcock* 19133, Nov. 5, 1921 (NH). INDO-CHINA: Tonkin: "Bord des chemins en forêt, Massif du Tom Dao," alt. 1000 m., *Pélelot* 3839, Nov. 1930 (NH, NY).

4. *Garnotia trisetata* Hitchc. *Lingn. Sci. Jour.* 7: 200. 1931.

Perennial; culms 20-40 cm. tall, tufted, erect, simple, glabrous, the nodes pubescent; leaves mostly basal; sheaths glabrous or the throat sparsely pilose; collar short-pubescent to pilose; ligule membranous, 0.2-0.3 mm. long, minutely erose, ciliolate; blades 5-13 cm. long, 2-4 mm. wide, linear-lanceolate, acute to acuminate, sparsely pilose on the upper surface, glabrous on the lower, the margins weakly scaberulous; panicles narrow, 10-15 cm. long (rarely much longer), the main axis and branches scabrous, the latter appressed or slightly ascending, in fascicles of 3's at the lower nodes, paired to solitary toward the summit; spikelets dorsally compressed, 3-4 mm. long, about 0.8 mm. wide, narrow-lanceolate, pubescent around the base, in pairs, one pedicel short, the other about as long as the spikelet; glumes equal or subequal, the nerves scabrous, the tips acute, extending into an awn 3-5 mm. long; lemma as long as the glumes, glabrous, acute to acuminate, terminating in a slender, scaberulous, straight or slightly wavy awn 8-15 mm. long; palea membranous, the margins auricled below the middle, sparsely soft-pubescent from above the auricles to the tip; lodicules membranous, spatulate-cuneate, glabrous.

TYPE AND LOCALITY: "Type in the U. S. National Herbarium, no. 1106729, collected in moist shady place along stream on Lohfau Mountain, Kwangtung Province, China, Oct. 28, 1921, by A. S. Hitchcock (no. 19003)."

CHINA: Kwangtung: Loh Fau, *Levine* (*Lingn. Univ. Herb.* no. 10234), Oct. 28, 1921 (NH); Loh Fau Mountain, 20 miles north of Sheklung, moist shady place along stream, *Hitchcock* 19003, Oct. 28, 1921 (NH, ISOTYPE); Teng Woo Mountain, *Levine* (*Cant. Christ. Coll.* no. 69), Nov. 19, 1916 (NH, paratype); Kwangsi: Tonghan (along Kwangtung border), near Sap-luk Po village (Waitsap District), *Tsang* 22775, Sept. 14, 1933 (G).

4a. *Garnotia trisetata* Hitchc. var. *decumbens* Keng, *Sunyatsenia* 3: 18. 1935.

Culms 45-90 cm. tall, 2-3 mm. thick, ascending from a decumbent base, rooting at the lower nodes; blades as much as 35 cm. long and 8 mm. wide; panicles 20-40 cm. long, the branches erect-ascending, as much as 15 cm. long; spikelets about 4 mm. long, similar to those of the type.

The foregoing description is a translation from the original Latin diagnosis, no specimen being available for examination.

TYPE AND LOCALITY: "... collected by the side of a stream, Sunyi, Kwangtung, China, August 12, 1931, by C. Wang (no. 31157)" (AS).

5. *Garnotia caespitosa* sp. nov. PLATE II.

Perennis; culmi usque ad 40 cm. alti, caespitosi, nodis pubescentibus; vaginae glabrae, marginibus in parte superiore ciliatis, collari pubescente; laminae 5–12 cm. longae, circa 2 mm. latae, utrinque papilloso-pilosae; paniculae 10–20 cm. longae, angustae; spiculae 3–4.5 mm. longae, circa 0.5 mm. latae; glumae subaequales, breviter aristatae; lemma anguste lanceolatum, 3-nerve, apice acuminatum, integrum, arista tenui, erecta, rigida, recta vel paullum flexuosa ad apicem non tortuosa, 10–15 mm. longa.

Perennial; culms up to 40 cm. tall, caespitose, slender, erect, or sometimes slightly ascending from the base, simple, or occasionally branching and rooting at the pubescent nodes; internodes glabrous; sheaths with prominent veins, ciliate along the upper part of the margins, otherwise glabrous; collar pubescent; ligule membranous, about 0.3 mm. long, ciliolate; blades 5–12 cm. long, about 2 mm. wide, flat, sometimes becoming involute at maturity, papillose-pilose on both surfaces except for the glabrous base of the upper surface, the margins weakly scaberulous, gradually becoming smooth toward the base, the tips acuminate; panicles 10–20 cm. long, narrow, the main axis and branches smooth or nearly so, the latter in fascicles of not more than 3 at the lower nodes, paired to solitary toward the apex; spikelets dorsally compressed, 3–3.5 mm. long, about 0.5 mm. wide, lanceolate to narrow-lanceolate, pubescent at the base, the hairs 0.5 mm. long, in pairs, the strongly unequal pedicels angular, glabrous; glumes subequal, the nerves scaberulous, gradually becoming smooth from middle to base, the internerves glabrous, the tips acute to acuminate, short-awned; lemma as long as the second glume, narrow-lanceolate, narrowed toward the base, thinly coriaceous, rounded on the back, faintly 3-nerved, glabrous, acuminate, entire, awned, the awn scaberulous, slender, stiff, straight or weakly flexuous from the base to the tip, 10–15 mm. long; palea shorter than the lemma, narrow-lanceolate, membranous, the margins auricled below the middle, sparsely soft-pubescent from above the auricles to the tip; lodicules spatulate-cuneate, glabrous.

TYPE in the U. S. National Herbarium, no. 1238135, collected at Los Baños, Laguna Province, Luzon Island, Philippines, March 6, 1913, by F. C. Gates (no. 6237) (NH).

PHILIPPINES: *Philip. Bur. Sci.* 14209 (no collector nor locality given) (NH); Luzon: Isabela Province, San Mariano, *Ramos & Edaño* (*Philip. Bur. Sci.* 47127), Feb.–Mar. 1926 (NH, NY); Mountain Province, Benguet, Sablan, *Elmer* 6210, April 1904 (NH, NY); Benguet, Bagoio, *Elmer* 8898, Mar. 1907 (NH, NY); Bulacan Province, Angat, *Ramos & Edaño* (*Philip. Bur. Sci.* 34069), Feb. 1919 (UC); Laguna Province, *Catalan* (*Philip. Bur. For.* 26465), Feb.–Mar. 1917 (NH); San Antonio, *Ramos* (*Philip. Bur. Sci.* 20403), Feb. 1913 (NH); Mt. Banajao, *Robinson* (*Philip. Bur. Sci.* 9763), Mar. 5–7, 1910 (NH, NY); Mindanao: Zamboanga Province, Malangas, *Ramos & Edaño* (*Philip. Bur. Sci.* 36776), Oct.–Nov. 1919 (NH); Isabela de Basilan, *Ebalo* 907, Jan. 5–18, 1941 (UM). CHINA: Kwangtung: Canton, Ting-u Shan, at the base of running water, *Sampson* (*Herb. Hance* no. 8135[?]), Oct. 1867 (G). INDO-CHINA: Tonkin: Chapa, on rocks by the side of stream, alt. 1500 m., *Pételot* 3253, Jan. 1928 (NH, NY).

This species is closely related to *Garnotia mindanaensis* Santos, differing

chiefly in the erect, rigid, straight or weakly flexuous awn of the lemma, and in the plainly evident hairs at the base of the spikelets.

6. *Garnotia mindanaensis* Santos, Jour. Wash. Acad. Sci. **33**: 135. f. 1. 1943.

Garnotia stricta Brongn. var. *longiseta* Hack. in Kneucker, Allgem. Bot. Zeitschr.

15: 141. 1909. Described from Mt. Mariveles, Bataan Province, Luzon, Philippines.

Perennial, 45–55 cm. tall; culms simple, tufted, erect or slightly geniculate toward the base, glabrous, the nodes pubescent; sheaths glabrous to short-pilose, the veins prominent; collar pubescent; ligule about 0.2 mm. long, glabrous to ciliate; blades 8–25 cm. long, 3–10 mm. wide, linear-lanceolate, flat, glabrous to short-pilose, the margins scaberulous; panicles 10–28 cm. long, narrow, interrupted, the branches loosely appressed; spikelets dorsally compressed, 4–4.5 mm. long, 0.5–0.6 mm. wide, narrowly lanceolate, with very short hairs at the base, in pairs, the pedicels short, unequal; glumes subequal, the nerves scaberulous to scabrous, the inter-nerves glabrous, the tips short-awned (sometimes awnless); lemma at maturity equaling the glumes, lanceolate, glabrous, 3-nerved, acute, awned, the awn 1–2.5 times as long as the lemma, erect, rigid, straight or weakly flexuous to above the middle, capillary, strongly flexuous to tortuous toward the tip, the tortuous part sometimes drooping or deciduous at maturity; palea narrowly lanceolate, the margins auricled toward the base, soft-pubescent from above the auricles to the tip; lodicules spatulate, glabrous.

Since the publication of the original description of this species, numerous specimens of *Garnotia* from the Philippines have been studied. After examining about 25 collections which were determined as belonging to this species, it became evident that an important character had been overlooked. Most of the mature spikelets of the type specimen did not show the capillary, tortuous upper part of the awn of the lemma. A detailed description of this awn is therefore included in the preceding paragraph.

TYPE AND LOCALITY: "Type in the herbarium of the University of Michigan, duplicate type in the U. S. National Herbarium, collected by H. H. Bartlett, no. 17235, Dec. 6, 1940, grassland at Del Monte, Bukidnon, Mindanao Island, Philippines."

PHILIPPINES: (Philip. Bur. Sci. Herb. 13983, no collector nor locality given) (NH); *Lohr* 7185, no locality (NH); Luzon: Ilocos Norte Province, *Merritt & Darling* (Philip. Bur. For. 15517), Nov. 1908 (NH, NY); Cagayan Province, *Ramos* (Philip. Bur. Sci. 13983), Feb. 1912 (NH); *Curran* (Philip. Bur. For. 16842), Mar. 1909 (NH); Mountain Province, Bontoc, Bauco, *Vanoverbergh* 4005, Dec. 1915 (NH); Benguet, *Ramos* (Philip. Bur. Sci. 5319), Dec. 1908 (NH, NY); Zambales Province, Mt. Tapolao, *Ramos & Edaño* (Philip. Bur. Sci. 44721), Nov.–Dec. 1924 (NH, NY); Pampanga Province, Mt. Arayat, *Clemens* 16211, Oct. 31, 1925 (NY); *Merrill* 3903, Oct. 1904 (NH, NY); Bulacan Province, *Ramos* 1933, Dec. 1914 (NY, G); Bataan Province, Mt. Mariveles, *Merrill* (Kneucker, Gram. Exsic. 744), Dec. 12, 1908 (G); *Elmer* 6989, Nov. 1904 (NY); *Williams* 236, Nov. 27, 1903 (NH, NY); Rizal Province, *Ramos* 596, Nov. 1910 (NH); *Ramos* (Philip. Bur. Sci. 24081), Dec. 1915 (NH, NY, G); Mt. Irid, *Ramos & Edaño* (Philip. Bur. Sci. 48501), Nov. 1926 (NH, NY); San Andales, *Edaño* (Philip. Bur. Sci. 48733), Dec. 1926 (NY); Montalban, *Merrill* 6237, Nov. 1908 (NH, NY); Tayabas Province, Guinayanán, *Escritor* (Philip. Bur. Sci. 20904), Mar.–Apr. 1913 (NH, NY); Albay Province, Mayon volcano, *Ramos & Edaño* (Philip. Bur. Sci. 75748), Sept. 1928 (NY); Catanduanes Island, *Ramos & Edaño* (Philip. Bur. Sci. 75257), Jul.–Sept. 1928 (NY); Sorsogon Province, Mt. Bulusan, Irosin, in soil among rocks of light shaded woods along upper edge of Sibulan River falls, alt. 2750 ft., *Elmer* 16633, July 1916 (NH, NY, G); Visayan Islands:

Island of Leyte, *Menzel 1519*, July 28, 1915 (NY, G); Island of Bohol, *Ramos* (Philipp. Bur. Sci. 42880), Aug.-Oct. 1923 (NH); Mindanao: Bukidnon Province, grassland at Del Monte, *Bartlett 17235*, Dec. 6, 1940 (UM, TYPE; NH, isotype); Davao Province, Mt. Apo, Todaya, *Elmer 11773*, Sept. 1909 (NH); Todaya, in dry rather stony soil of a wooded ridge, alt. 2000 ft., near Sibulan River, *Elmer 11298*, Aug. 1909 (NH, NY); Zamboanga Province, *Merrill 5484*, Oct. 10, 1906 (NH).

7. *Garnotia mutica* (Munro) Druce, Rep. Bot. Soc. Exch. Club **1916**: 624. 1917. Later combination with the same basis, *G. mutica* (Munro) Janowski in Mez, Rept. Sp. Nov. **17**: 86. 1921.

Berghausia mutica Munro, Proc. Amer. Acad. **4**: 362. 1860.

Garnotia tectorum Hook. f. Fl. Brit. Ind. **7**: 242. 1896. Described from Ceylon.

Garnotia patula Munro var. *mutica* Rendle ex Forbes & Hemsley, Jour. Linn. Soc. Bot. **36**: 387. 1904. Based on *Berghausia mutica* Munro.

Perennial; culms 30–40 cm. tall, erect, simple, glabrous, the nodes pubescent; blades mostly basal; sheaths glabrous, longer than the internodes; collar pubescent; ligule membranous, the margins minutely erose, ciliolate; blades elongate, 25–50 cm. long, 4–6 mm. wide, flat, glabrous or the upper surface with a few, long, widely distributed, papillose-base hairs, the base of the blade densely pubescent with short and long hairs intermixed, the nerves and margins scaberulous; panicles about 32 cm. long, the branches slender, up to 11 cm. long, ascending to spreading, in distant fascicles of 3's, or those toward the summit paired to solitary; spikelets dorsally compressed, 4.5–5.5 mm. long, about 0.8 mm. wide, lanceolate to narrow-lanceolate, bearded around the base, in distant pairs, one pedicel short, the other about as long as the spikelet; glumes equal to subequal, the nerves scaberulous, the tips acuminate, awnless or the first glume mucronate; mature lemma equaling the glumes, short-stipitate, acuminate, awnless, glabrous, 3-nerved; palea shorter than the lemma, the margins auricled toward the base, sparsely soft-pubescent from above the auricles to the tip; lodicules cuneate, glabrous.

TYPE AND LOCALITY: "Hong Kong." Collected by Charles Wright (U. S. North Pac. Expl. Exped. 1853–56). Collector's number not indicated.

CHINA: Kwangtung: Hongkong, *C. Wright* (U. S. North Pac. Expl. Exped. 1853–56) (NH, G, ISOTYPES).

8. *Garnotia philippinensis* sp. nov. FIG. 1.

Perennis; culmi 35–55 cm. alti, erecti, simplices, nodis pubescentibus; vaginae glabrae vel sparse pilosae, collari dense pubescente; laminae 10–30 cm. longae, 3–8 mm. latae; paniculae circa 20 cm. longae, angustae; spiculae 4–5 mm. longae, 0.5–0.7 mm. latae, basi breviter pubescentes; glumae acuminatae, muticae; lemma 1-nerve, acuminatum, muticum.

Perennial; culms 35–55 cm. tall, erect, simple, glabrous, the nodes pubescent; sheaths longer than the internodes, those near the base sometimes sparsely pilose, the upper glabrous or the throat with few long hairs; collar densely pubescent; ligule about 0.2 mm. long, minutely erose, ciliolate; blades of the basal leaves reduced, those of the upper 10–30 cm. long, 3–8 mm. wide, linear-lanceolate, acuminate, the upper surface with short, sparse pubescence toward the tip, the base densely pubescent with short hairs mixed with a few long ones, the rest of the blade glabrous, the nerves and margins scaberulous; panicles about 20 cm. long, narrow, conspicuously interrupted toward the base, the branches weakly scabrous, usually appressed, up to 4 cm. long; spikelets dorsally compressed, 4–5 mm. long,

0.5–0.7 mm. wide, narrow-lanceolate, short-pubescent at the base, in pairs, the pedicels short, unequal; first glume as long as the spikelet, acuminate; second glume usually shorter than the first, acute to acuminate, the mid-nerve running along a prominent, longitudinal, median depression, both glumes awnless, scaberulous on the nerves, sparsely puberulent on the internerves; lemma narrow-lanceolate, glabrous, 1-nerved, acuminate, awnless; palea shorter than the lemma, the margins auricled toward the base, sparsely pubescent from the auricles to the tip; lodicules spatulate-cuneate, glabrous.

TYPE in the U. S. National Herbarium (Philip. Bur. Sci. no. 42963), collected from the Island of Bohol, Visayan Islands, Philippines, Aug.–Oct., 1923, by Maximo Ramos.

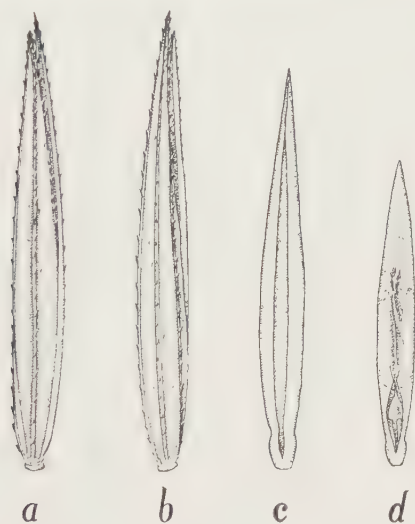


FIG. 1. *Garnotia philippinensis* Santos, drawn from the type deposited in the U. S. National Herbarium (Philip. Bur. Sci. no. 42963): a. and b. ventral and dorsal views of the spikelet respectively; c. lemma; d. palea (a-d, $\times 14$).

This species is distinguished from all Philippine forms of *Garnotia* in having awnless spikelets. The habit of the plant and the structure of the spikelet suggest *Garnotia mutica* (Munro) Druce, of Hongkong, from which the new species differs in the absence of long, tuberculate-base hairs, which are very sparsely distributed along the entire length of the blades in *G. mutica*, and in having a narrow panicle with branches not more than 4 cm. long, the spikelets approximate, as many as 10 pairs along the appressed branches.

EXPLANATION OF PLATES

All figures are drawn from types deposited in the U. S. National Herbarium.

PLATE I

Garnotia fragilis Santos (*Pételot* 4745): *a.* habit, $\times \frac{1}{2}$; *b.* inflorescence, $\times \frac{1}{2}$; *c.* spikelets, $\times 14$; *d.* lemma, $\times 14$.

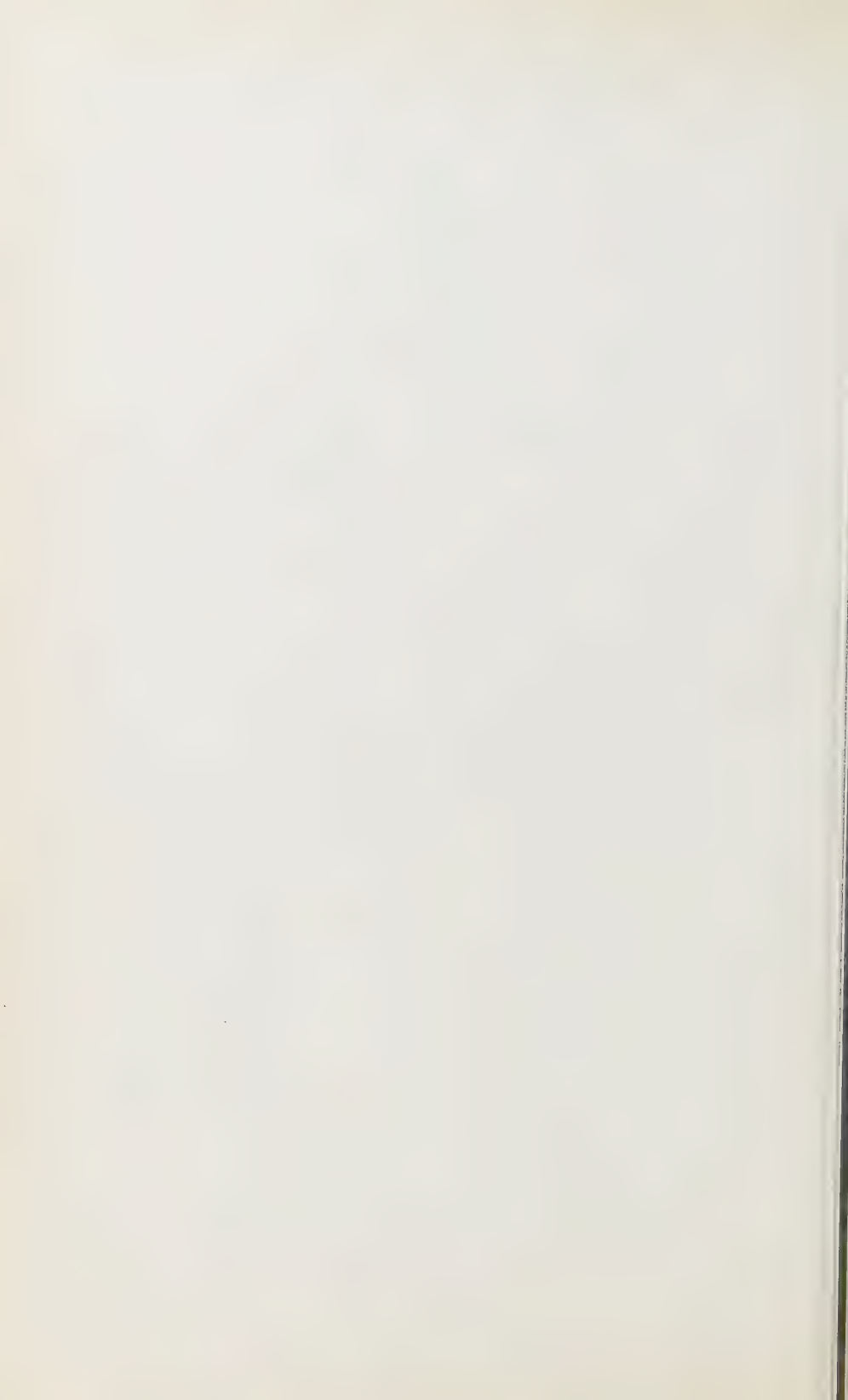
PLATE II

Garnotia caespitosa Santos (*Gates* 6237): *a.* habit, $\times \frac{1}{2}$; *b.* ligule and adjacent parts, $\times 5$; *c.* and *d.* dorsal and ventral views of the spikelet respectively; *e.* lemma (*c-e*, $\times 14$).

BOTANY DEPARTMENT AND BOTANICAL GARDEN,
UNIVERSITY OF MICHIGAN.



GARNOTIA FRAGILIS SANTOS





GARNOTIA CAESPITOSA SANTOS



THE COMPARATIVE MORPHOLOGY OF THE WINTERACEAE
III. WOOD

I. W. BAILEY

With four plates

GÖPPERT (22) in 1842 noted the absence of vessels in the wood of *Drimys Winteri* J. R. and G. Forst. His observations have been verified by Eichler (18), Möller (29), De Bary (17), Solereder (34, 35), Strasburger (36), Groppler (23), and many other anatomists and taxonomists. That *Trochodendron* has a similar vesselless type of wood was reported by Eichler (18) in 1864. *Tetracentron* was subsequently added to the list by Harms (24) in 1897. It was upon the basis of their vesselless wood that van Tieghem (38) segregated the genera *Drimys*, *Pseudowintera*,¹ *Bubbia*, *Belliolum*, *Exospermum*, *Zygogynum*, *Trochodendron*, and *Tetracentron* in three families of a distinct order, the Homoxylées. Thompson and Bailey (37) and Bailey and Thompson (9) studied all organs and parts of *Drimys Winteri* J. R. & G. Forst., *Pseudowintera axillaris* var. *colorata* (Raoul) A. C. Sm., *Trochodendron*, and *Tetracentron*, and demonstrated that vessels and vessel-like structures are absent throughout both the primary and secondary bodies of these plants.

In assembling all available collections of Winteraceae for taxonomic revision, my colleague Dr. Smith (32, 33) has provided me with the unusual opportunity of studying the anatomy of a wide range of accurately identified representatives of the family. Vessels are invariably absent from both the primary and the secondary xylem. Parmentier (30) obviously erred in reporting the presence of vessels in two putative species of *Drimys*. As van Tieghem (38) and others have shown, Parmentier's observations were based upon incorrectly determined material. Thus, increasing evidence accumulated by many investigators during the last 100 years indicates that the Winteraceae (excluding *Illicium*), *Trochodendron*, and *Tetracentron* are the only known living representatives of the dicotyledons that have a primitive vesselless type of secondary xylem. This is not indicative necessarily of close genetic relationship between the Winteraceae, *Trochodendron*, and *Tetracentron*, as assumed by van Tieghem, but rather the occurrences are to be regarded as retentions of a primitive ranalian type of wood by three families which exhibit diverse trends of specialization in their other vegetative characters and in their reproductive organs.

During the last 25 years, the study of the comparative anatomy of the cambium and xylem has progressed rapidly to a stage where it is possible to visualize the salient trends of evolutionary specialization of these tissues

¹*Pseudowintera* Dandy, i.e. *Wintera* sensu v. Tiegh., non Murray.

in the gymnosperms and angiosperms. Particularly in the case of the cambium (2, 3, 4), vessels (6, 10, 16, 19, 20, 21), imperforate tracheary cells (7, 10), and rays (8, 12, 13, 14, 27) of dicotyledons, the irreversible trends of structural specializations are so obvious and clearly defined that they may be utilized, even statistically, in evaluating the levels of morphological specialization that have been attained within specific groups of plants (6, 7, 8, 25, 26, 39, 40).

The cambium of the Winteraceae, as of *Trochodendron* and *Tetracentron*, is of the same cytological and histological type as that which occurs so characteristically in the lower vascular plants which form vesselless secondary xylem. The fusiform initials of the non-stratified cambium periodically divide diagonally, elongate extensively, and commonly attain lengths of as much as 5000 microns in the outer parts of old stems. Since the changes in length and tangential diameter of the tracheary derivatives are relatively slight during tissue differentiation, the tracheids of the Winteraceae resemble the fusiform initials in length and tangential outline and tend to be arranged in relatively undisturbed radial seriations, *Figs. 1-3* and *7-9*. The primitive character of the cambium and xylem in the Winteraceae, *Trochodendron*, and *Tetracentron* rules out any possibility of these plants having developed vessels and subsequently having lost them. Wherever vessels have originated (primary body of *Selaginella*, *Pteridium*, and monocotyledons, secondary body of Gnetales and dicotyledons), their development is closely correlated with fundamentally significant cytological, histological, and ontogenetic changes in the xylem. In the case of the dicotyledons, which have now been very comprehensively investigated, the development and the specialization of vessels is closely synchronized with significant changes in the cambium and xylem. Furthermore, it should be emphasized in this connection that in those dicotyledons (e.g. Cactaceae, Crassulaceae, aquatics, and other super-specialized forms) where there is a tendency towards the reduction or elimination of vessels, the tissues are obviously profoundly modified and highly specialized. There is no evidence of reversible transitions leading toward a reversion to the primitive type of cambium and xylem that characterizes the Winteraceae, *Trochodendron*, *Tetracentron*, and the lower vascular plants.

In the past, many investigators have referred to the wood of *Drimys* as having a coniferous type of structure. Such comparisons between the Winteraceae and the Coniferae are misleading, since they overlook outstanding structural differences. The wood rays of the Winteraceae, *Trochodendron*, and *Tetracentron* are of the primitive heterogeneous type I (Barghoorn, 12) that characterizes the secondary xylem of anatomically less specialized dicotyledons. Two widths of rays occur typically in this form of ray structure: (a) uniseriataes and (b) multiseriataes. The uniseriate rays which extend outward from the fascicular parts of the stele are composed of vertically much elongated cells, whereas the multiseriate rays which extend outward from the gaps in the stele are constituted of more nearly isodiametric or radially elongated cells, *Figs. 1-6*. Both

types of rays increase in number in enlarging stems by appropriate cytological changes in the cambium (Barghoorn, 12); both are much extended longitudinally in the first formed secondary xylem and are dissected into lower rays during subsequent enlargement of the stem. In the Cordaitales, Ginkgoales, and Coniferae, not only are there no multiseriate rays comparable to those of the dicotyledons, but also the characteristically uniseriate (occasionally bi- or tri-seriate) rays are of a basically different type. The coniferous uniseriate ray is very low in the first-formed secondary xylem and commonly increases in height during subsequent enlargement of the stem (Barghoorn, 11). Furthermore, it is composed usually of radially rather than vertically elongated cells. Mixtures of narrow and wide rays do occur, however, in the wood of the Pteridospermae, Bennettitales, and Cycadales, and the wood of Pteridospermae frequently exhibits a heterogeneous type of ray structure (Andrews, 1).

The tracheary pitting in the primary xylem of *Ginkgo*, the Coniferae, and the Gnetales is of a highly modified type (Bailey, 5) and is entirely unlike that which characterizes the lower vascular plants and the angiosperms. Furthermore, the scalariform and transitional types of tracheary pitting in the secondary xylem of the Winteraceae, *Trochodendron*, and *Tetracentron* have no counterparts among the Cordaitales, Ginkgoales, Coniferae, or Gnetales, but closely resemble those types that occur in the secondary xylem of certain Bennettitales and *Protopitys*. Thus, if the vesselless wood of the Winteraceae is to be compared with that of the gymnosperms, it should be with the secondary xylem of Pteridospermae and Bennettitales rather than with that of the Coniferae, Ginkgoales, or Cordaitales.

The wood parenchyma, tracheids, and rays of the Winteraceae fluctuate considerably in available samples of the wood of different representatives of the family, *Figs. 1-8, 10, and 11*. Thus the woods of the New Caledonian *Zygogynum Vieillardii* Baill., *Figs. 1 and 4*, the Solomon Island *Belliolum haplopus* (Burt) A. C. Sm., *Figs. 3 and 6*, and the Chilean *Drimys Winteri* J. R. and G. Forst., *Figs. 2 and 5*, are composed of much larger tracheids than those of the Australian *Drimys lanceolata* (Poir.) Baill., *Figs. 7 and 10*, and the New Zealand *Pseudowintera axillaris* var. *colorata* (Raoul) A. C. Sm., *Figs. 8 and 11*. Growth rings, *Fig. 7*, are well developed in the sample of *Drimys lanceolata* but are not detectable in the other illustrated specimens. Wood parenchyma, which is absent or of infrequent occurrence in *Drimys Winteri*, *Fig. 2*, is more or less abundantly developed in the other woods and exhibits diffuse, diffuse-in-aggregates, and tangentially banded distributions. The multiseriate rays vary in height and width, in the size and form of their constituent cells, and in their number within a unit area, *Figs. 1-8, 10, and 11*. The uniseriate rays fluctuate in height and in the vertical extension of their constituent cells. The character of the tracheary pitting also varies considerably, the ratios of scalariform to multiseriate-circular to uniseriate-circular fluctuating from specimen to specimen.

It has been customary in the past to utilize such differences in the construction of keys for differentiating the woods of genera and species. There is, however, a very considerable element of uncertainty in so doing, unless unusually extensive collections of each species are available. This is due to the fact that the structural characters enumerated in the preceding paragraph commonly fluctuate more or less markedly, not only within different parts of the same tree, but also in trees grown under different environmental conditions. Furthermore, it is difficult at present to determine from herbarium specimens (twigs) what the expression of diagnostic characters in the outer parts of large stems will be. Therefore, any deductions regarding generic differences between the woods of the Winteraceae are tentative and subject to future verification. Available material suggests that there are at least two significant trends of structural specialization within the Winteraceae, one leading toward a marked reduction in the amount of wood parenchyma in the New World *Wintera* section of *Drimys*, and the other toward a reduction in cell size and a striking enlargement of the multiseriate rays in *Pseudowintera*.

The vesselless woods of *Trochodendron* (Japan and Formosa) and *Tetracentron* (Central China) are characterized by their conspicuous annual growth rings, *Fig. 9*. In fact, the growth rings are as contrastedly developed as those of *Keteleeria*, *Larix*, and other conifers of the northern hemisphere. The tracheids of the earlywood are large, thin-walled, and provided with scalariform bordered pitting such as occurs so generally in the tracheids of ferns. On the contrary, those of the latewood are smaller, thick-walled, and have scattered small circular bordered pits. The tracheids of the transitional region exhibit transitions between scalariform and multiseriate-opposite, multiseriate-alternate, and uniseriate-circular types of pitting, such as occur in the Winteraceae and certain Bennettitales (Bailey and Thompson, 9). The ray structure is conspicuously heterogeneous as in the Winteraceae, but the multiseriate rays (in wood from large stems) are lower, are composed of smaller cells, and have a fusiform outline in tangential sections, *Fig. 12*. Diffuse parenchyma is confined largely to the latewood, *Fig. 9*. Thus, the vesselless wood of *Trochodendron* and *Tetracentron* differs from that of the Winteraceae in its conspicuous growth layers, in the dominantly scalariform pitting of its earlywood, and in its specialized form of heterogeneous ray structure. The question arises how significant are such structural differences in considering possible relationships within the Ranales.

Growth rings in trees are commonly interpreted as being conditioned by environmental influences. There are, however, two distinct types of zonation phenomena in wood: (1) facultative and (2) obligate. Many tropical and subtropical plants as well as plants of the southern hemisphere form growth rings or not, depending upon the environment in which they are grown. The growth rings of certain Winteraceae, *Fig. 7*, as of many Podocarpaceae and Araucariaceae appear to be of this facultative type. On the contrary, many plants of the northern hemisphere form zonate wood

under all conditions of survival, both natural and experimental. The growth rings of *Trochodendron* and *Tetracentron*, with their associated characteristic type of tracheary pitting, appear to be of the obligate type. Thus, fossilized representatives of these genera from the Jurassic (?) of India (Sahne, 31), the Tertiary of northwestern United States (Beck, 15), and the Eocene of Greenland (Mathiesen, 28) have wood that is indistinguishable structurally from that of the postglacial living representatives.

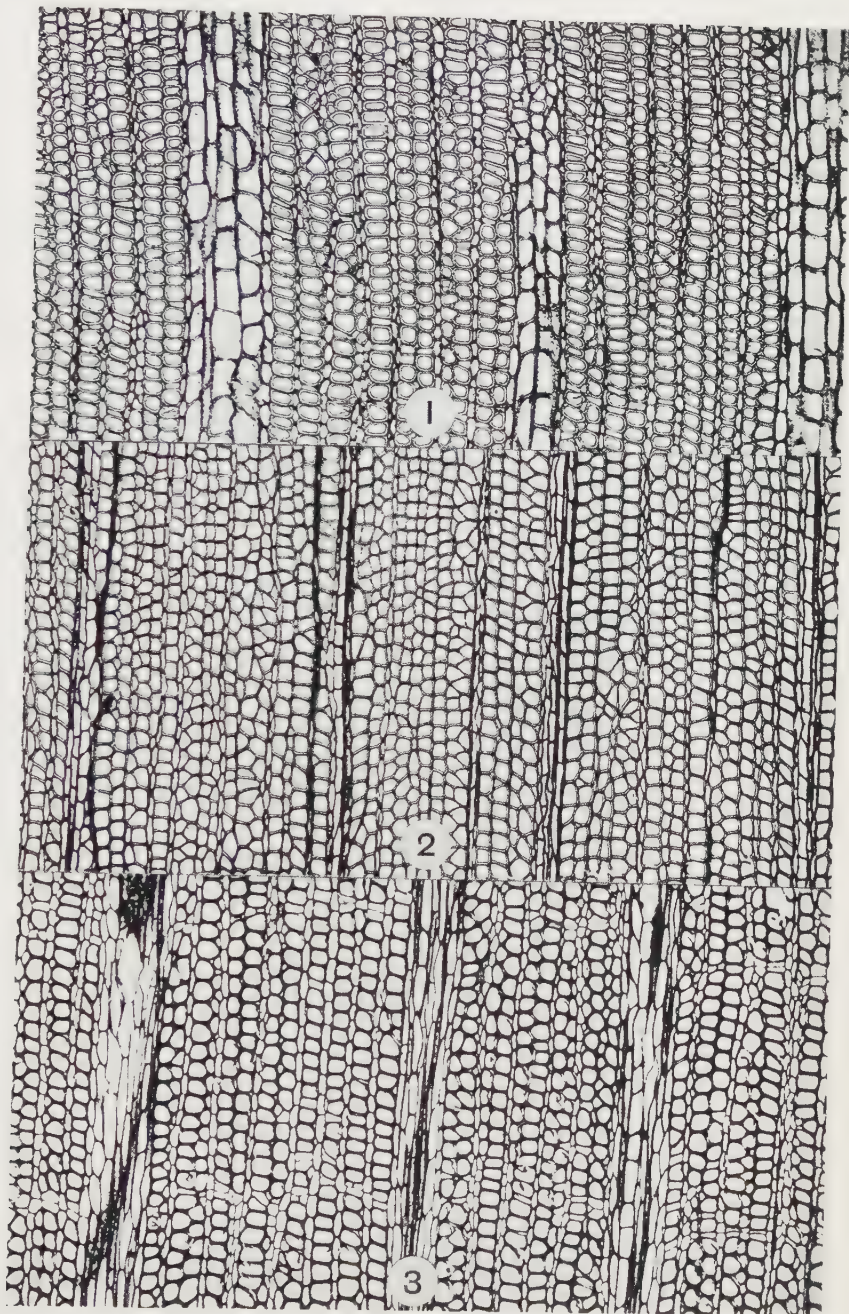
From the point of view of the comparative anatomy of the vascular plants as a whole, the obligate growth layers of *Trochodendron* and *Tetracentron* and the segregation of scalariform pitting in excessively thin-walled earlywood tracheids are evidence of structural specialization. The type of ray structure illustrated in *Fig. 12* arises in other dicotyledonous families as specializations from such ray forms as occur in the Winteraceae. This suggests that the wood of the Winteraceae is of a more primitive and plastic ranalian type, resembling that from which the modified and stereotyped wood of *Trochodendron* and *Tetracentron* has been derived. It should be noted in this connection that in young stems of Winteraceae (Bailey and Thompson, 9), as in the wood of certain Bennettiales, the scalariform tracheids tend to be segregated in the earlywood when unusually conspicuous growth layers are developed.

It is unlikely that the dicotyledonous type of vessel could have originated in a specialized vesselless wood of the trochodendraceous type, since the more primitive types of vessels in dicotyledons are diffused throughout the wood and are not in zonal arrangements. Although the plastic vesselless wood of the Winteraceae more closely approximates the type in which vessels originated, the actual ancestral forms must have contained a higher ratio of scalariform pitting than occurs in most living representatives of the Winteraceae, which exhibit evidences of reduction in the amount of such pitting. When the summation of evidence from all organs and parts of the plants is taken into consideration, there are no convincing arguments for deriving the Trochodendraceae from the Winteraceae or vice versa or even for inferring that these families are closely related genetically. Nor can one assume that other ranalian families were derived from these specific vesselless families. Each of the latter exhibits a combination of more or less primitive and specialized characters, indicative of reticulate rather than linear relationships and of common origin from an ancestral ranalian stock. Until essential fossilized material is discovered, the composite structure of such ancestors can be synthesized only by combining the more primitive features of a number of diverse families.

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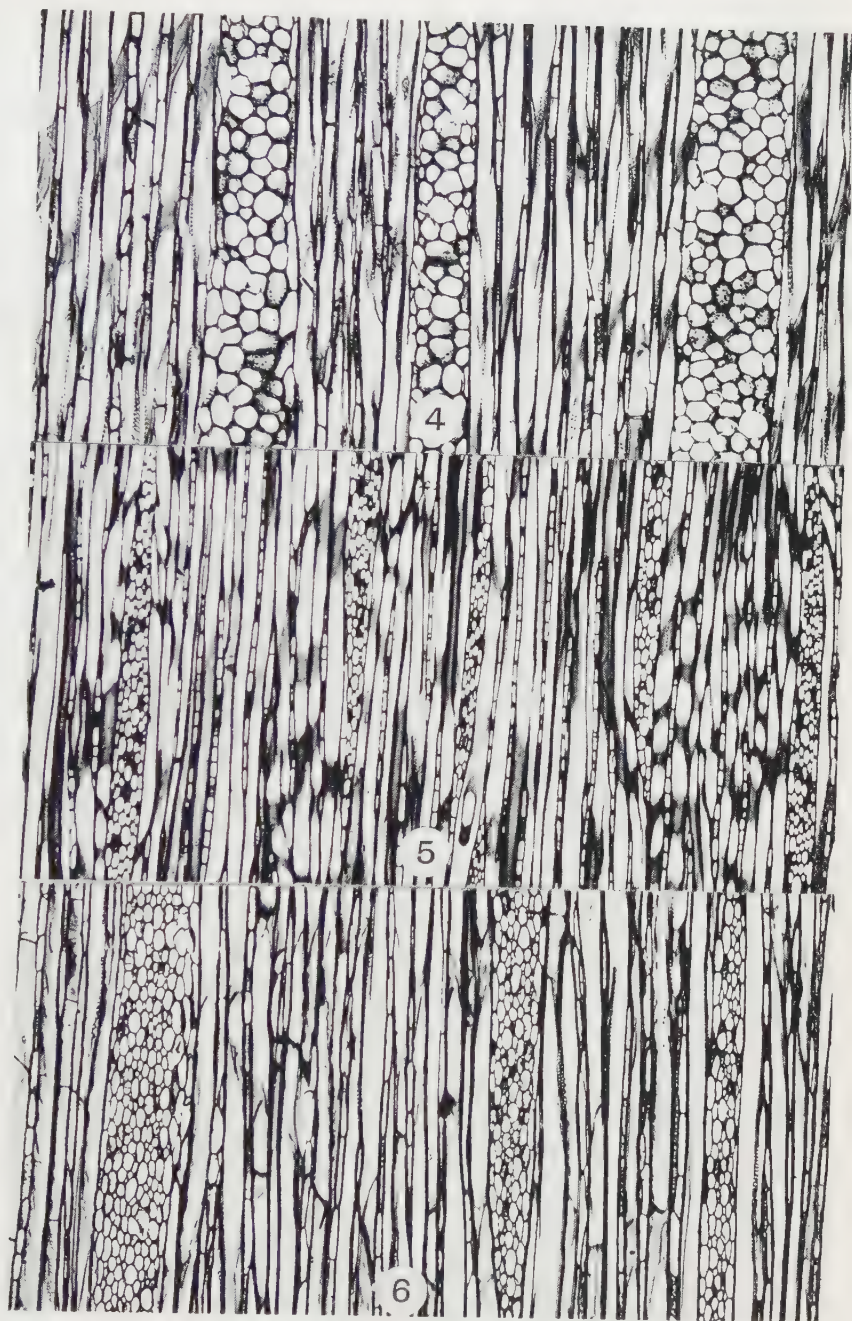
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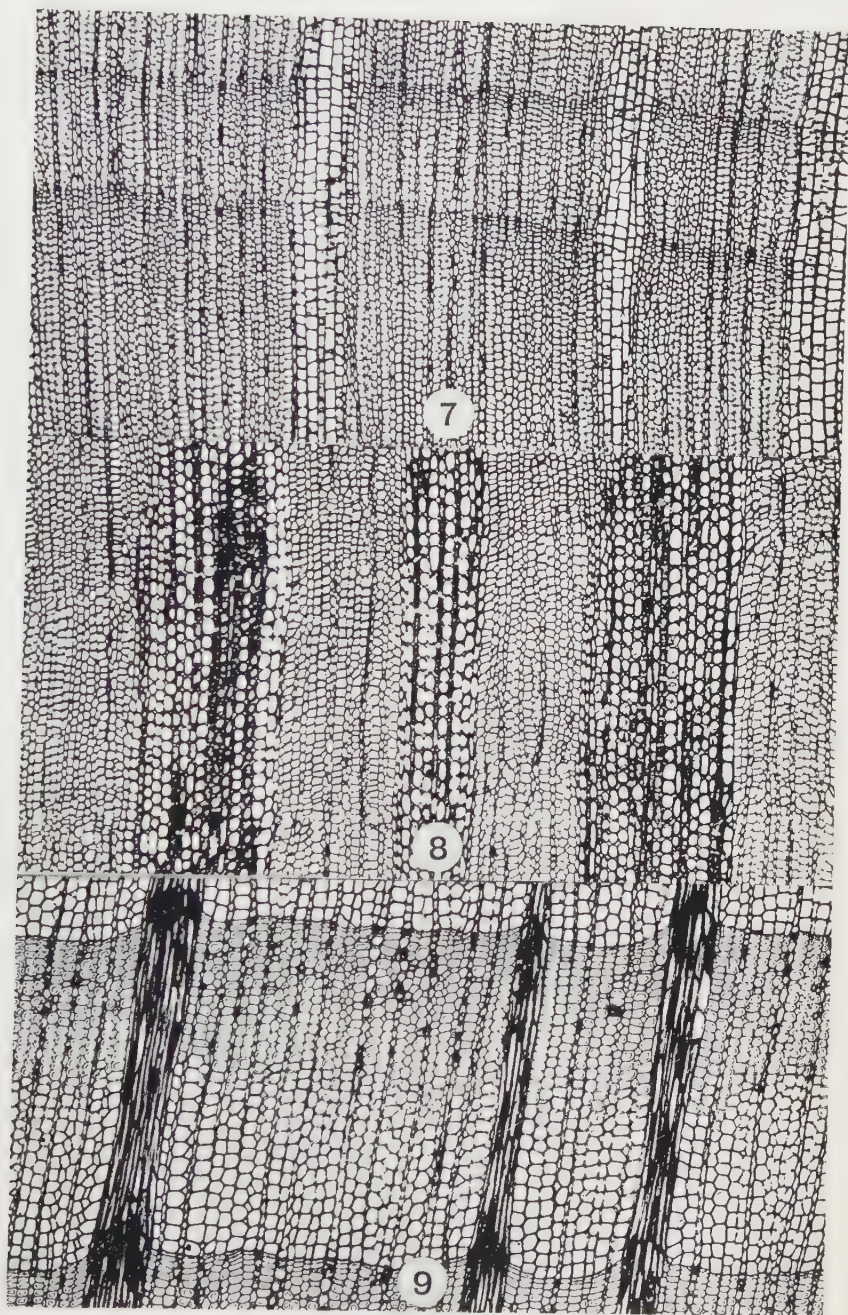
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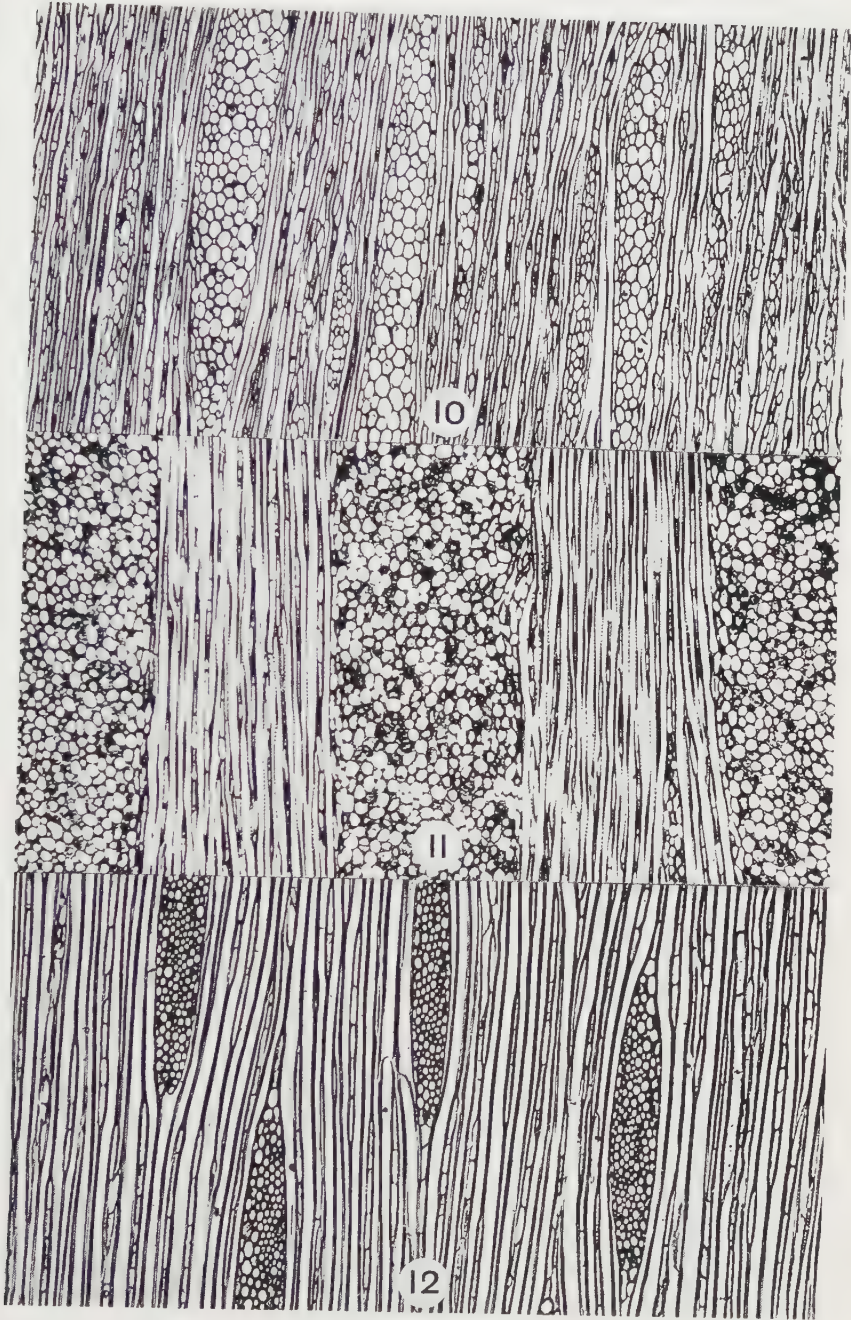
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EXPLANATION OF PLATES

PLATE I

FIG. 1. *Zygogynum Vieillardii* Baill., *Y. U.* 14295. Transverse section of the wood, $\times 50$. FIG. 2. *Drimys Winteri* J. R. and G. Forst., *H. U.* 17320. Transverse section of the wood, $\times 50$. FIG. 3. *Belliolum haplopus* (Burt) A. C. Sm., *Y. U.* 22694. Transverse section of the wood, $\times 50$.

PLATE II

FIG. 4. *Zygogynum Vieillardii*, *Y. U.* 14295. Tangential section of the wood, $\times 50$. FIG. 5. *Drimys Winteri*, *H. U.* 8949. Tangential section of the wood, $\times 50$. FIG. 6. *Belliolum haplopus*, *Y. U.* 22694. Tangential section of the wood, $\times 50$.

PLATE III

FIG. 7. *Drimys lanceolata* (Poir.) Baill., *Y. U.* 16121. Transverse section of the wood, $\times 50$. FIG. 8. *Pseudowintera axillaris* var. *colorata* (Raoul) A. C. Sm., *H. U.* 15776. Transverse section of the wood, $\times 50$. FIG. 9. *Trochodendron aralioides* Sieb. & Zucc., *H. U.* 18074. Transverse section of the wood, $\times 50$.

PLATE IV

FIG. 10. *Drimys lanceolata*, *Y. U.* 16121. Tangential section of the wood, $\times 50$. FIG. 11. *Pseudowintera axillaris* var. *colorata*, *H. U.* 15776. Tangential section of the wood, $\times 50$. FIG. 12. *Trochodendron aralioides*, *H. U.* 18070. Tangential section of the wood, $\times 50$.

BIOLOGICAL LABORATORIES,

HARVARD UNIVERSITY.

STUDIES OF PAPUASIAN PLANTS, VI*

A. C. SMITH

ELAEOCARPACEAE

THE only comprehensive discussion of the Papuan species of Elaeocarpaceae is that published by R. Schlechter (in Bot. Jahrb. **54**: 92–155. f. 1–9. 1916), recognizing six genera and about 90 species in the group. Although numerous species have been described since 1916 by several writers, Schlechter's treatment remains a fairly adequate and highly useful summary; the general pattern of the family proposed by him is followed in the present paper. Fortunately, many of the species described by Schlechter and other students are represented by isotypes in American herbaria, and in the remaining cases the descriptions are in general adequate.

In connection with this treatment, herbarium specimens have been seen from the Arnold Arboretum (A), the New York Botanical Garden (NY), and the University of California (UC). In the absence of parenthetical letters indicating the place of deposit, cited specimens are deposited only at the Arnold Arboretum.

Sericolea Schlechter

Originally founded by Schlechter (in Bot. Jahrb. **54**: 95. Apr. 1916) to include six New Guinean species, *Sericolea* was subsequently amplified by the same author (in Rep. Sp. Nov. **16**: 29–32. 1919) to take in 14 species. Most of the later species were transfers from the following genera, which are synonyms of *Sericolea*: *Mischopleura* Wernham (in Hook. Ic. Pl. **31**: pl. 3059. June, 1916, and in Trans. Linn. Soc. II. Bot. **9**: 99. Aug. 1916), with two species, originally placed in the Ericaceae; *Pyrsonota* Ridley (in Trans. Linn. Soc. II. Bot. **9**: 40. Aug. 1916), with one species, originally placed in the Saxifragaceae; and *Hormopetalum* Lauterb. (in Bot. Jahrb. **55**: 257. 1918), with three species, originally placed in the Rutaceae. The last genus was not described by Lauterbach, who referred to an unpublished volume of Nova Guinea for the generic description and for descriptions of two species; a third species, *Hormopetalum Wernerii*, was described, and one may accept the genus as adequately published for this reason, and also since it was keyed in the discussion of the genera. Since Schlechter's second discussion of *Sericolea*, in 1919, two additional species have been described by O. C. Schmidt (in Nova Guin. Bot. **14**: 151–153. 1924) and in the same publication Lauterbach's undescribed species were validated by descriptions. The genus thus now consists of 16 species;

*Botanical Results of the Richard Archbold Expeditions. See Jour. Arnold Arb. **23**: 417–443. 1942.

from the descriptions it seems that most, if not all, of these are maintainable. In the present treatment five new species are proposed.

Sericolea elegans Schlechter in Bot. Jahrb. **54**: 98. 1916, in Rep. Sp. Nov. **16**: 31. 1919; Van Steenis in Nova Guin. Bot. **14**: 305. 1927.

NETHERLANDS NEW GUINEA: 15–18 km. southwest of Bernhard Camp, Idenburg River, alt. 1800–2150 m., *Brass* 12418 (common epiphyte, 2–3 m. high, on tall trees in mossy-forest; leaves glaucous beneath; flowers white), *Brass* 12637 (slender tree 2–3 m. high, abundant in low scrub on an exposed summit; leaves gray beneath; flowers white).

The species has previously been known only from the type collection, made in the Waria region of the Morobe District, Northeastern New Guinea, and from the Hellwig Mts. of Netherlands New Guinea. Our specimens precisely match the type collection (*Schlechter* 19756, UC).

Sericolea Werneri (Lauterb.) Schlechter in Rep. Sp. Nov. **16**: 32. 1919; Van Steenis in Nova Guin. Bot. **14**: 304. 1927.

*Hormopetalum Werner*i Lauterb. in Bot. Jahrb. **55**: 257. 1918.

NORTHEASTERN NEW GUINEA: Morobe District, Ogeramngang, alt. about 1800 m., *Clemens* 5518.

The cited specimen agrees very well with the original description, based on *Werner* 95, from the nearby Finisterre Mts. at 1700 m. The species appears to be very close to *S. elegans* Schlechter, being distinguished by its shorter pedicels and its leaf-blades being revolute (“involuta” in the description) at base. The stamens are said to be 10, but the *Clemens* specimen is in fruit and this point cannot be checked. Another fruiting specimen which possibly belongs here is *Clemens* 11212, from Matap, Morobe District, alt. 1500–1800 m. This specimen has leaves somewhat larger, up to 10.5×1.8 cm., but otherwise it agrees with *Clemens* 5518 and the original description.

Sericolea decandra sp. nov.

Frutex vel arbor 2–4 m. alta ut videtur multiramosa et dense foliata, ramis ramulisque gracilibus, juventute complanatis et dense aureo-sericeis mox subteretibus purpurascensibus glabrisque; foliis oppositis vel suboppositis, petiolis gracilibus 2–4 mm. longis primo ut ramulis sericeis demum glabrescentibus, laminis subcoriaceis oblongo-lanceolatis, 5–6.8 cm. longis, 1–1.6 cm. latis, basi obtusis, apice in acuminem gracilem calloso-mucronulatum 10–15 mm. longum gradatim attenuatis, margine basim versus saepe conspicue revolutis superne recurvatis, dentibus 3–7 per centimetrum spinulosis circiter 1 mm. longis praeditis, supra glabris vel costa puberulis, subtus densissime argenteo- vel juventute aureo-sericeis, costa supra elevata subtus prominente, nervis lateralibus multis obliquis cum rete venularum copioso anastomosantibus et venulis supra conspicue prominulis subtus indumento plus minusve obscuratis; inflorescentiis axillaribus racemosis floribus et fructibus inclusis 1–1.5 cm. longis, ubique floribus exceptis sericeo-puberulis demum subglabrescentibus, pedunculo 3–10 mm. longo complanato, rhachi brevi, bracteis minutis dentes 2 laterales subulatos circiter 1 mm. longos gerentibus; floribus 2–8 saepe 4 per inflorescentiam, pedicellis subcurvatis 4–6 mm. longis; sepalis 5 papyraceis ovato-lanceolatis, 2.2–2.5 mm. longis, 1–1.2 mm. latis, acutis, intus puberulis et leviter carinatis, extus sericeis; petalis 5 membranaceis obovatis longitudine sepala

subaequantibus, 1.3–1.6 mm. latis, apice plerumque emarginatis et bilobatis interdum irregulariter crenulatis; disco glabro 5-lobato, lobis carnosus profunde bilobatus circiter 0.5 mm. altis et latis; staminibus 10 alternatim leviter inaequalibus, brevioribus (circiter 0.7 mm. longis) lobis disci alternatis, longioribus (circiter 0.8 mm. longis) lobis disci oppositis, filamentis gracilibus glabris, antheris oblongis circiter 0.4 mm. longis apicem versus obscure setulosis; ovario glabro subgloboso sub anthesi circiter 1 mm. diametro, loculis 2 biovulatis, stylo crasso 0.5–0.7 mm. longo obscure bifido; fructibus subcarnosis maturitate circiter 3 mm. diametro, disco et stylo persistentibus, seminibus 4 subfalcato-oblongis 1–1.4 mm. longis.

NETHERLANDS NEW GUINEA: Vicinity of Lake Habbema, alt. 3345 m., *Brass* 9267 (TYPE), Aug. 1938 (shrub or tree 2–4 m. high, common in mossy thickets of ridge crests; branches erect; leaf-blades brownish above, argenteous beneath; flowers cream-colored; fruits black).

Sericolea decandra seems most closely allied to *S. Werneri* (Lauterb.) Schlechter, which is also described as having 10 stamens. The new species differs from *S. Werneri* in its rigid and subcoriaceous rather than papyraceous leaf-blades, which have less conspicuously attenuate tips, more obvious marginal teeth, and more conspicuous venation. The new species is further characterized by its more compact inflorescence and short pedicels; its sepals and petals are larger than those described for *S. Werneri*, but those were immature.

Other species with 10 rather than 15 stamens (the usual number for the genus) are *S. Ridleyana* (Wernh.) Schlechter and *S. Lamii* O. C. Schmidt, but these are quite unlike *S. decandra* in other respects. The staminal arrangement described above has been verified by many dissections, and the same arrangement is illustrated for *S. Ridleyana* and *S. Lamii*.

***Sericolea venusta* sp. nov.**

Arbor gracilis circiter 10 m. alta, ramulis elongatis gracilibus dense breviterque aureo-crispato-pilosis demum glabris purpurascens; foliis oppositis vel suboppositis, petiolis gracilibus circiter 1 mm. longis ut ramulis pilosis, laminis subcoriaceis ovatis, 15–25 mm. longis, 7–12 mm. latis, basi rotundatis vel obtusis, apice obtusis et callosio-apiculatis, margine utrinsecus dentibus 5–9 inconspicuis spinulosis praeditis, supra glabris, subtus densissime aureo-sericeis demum cano-puberulis, costa supra prominula subtus valde elevata, nervis secundariis utrinsecus 6–10 cum aliis interspersis et rete venularum intricato utrinque prominulis sed subtus indumento saepe obscuratis; inflorescentiis compactis axillaribus vel e ramulis defoliatis orientibus breviter racemosis 2–6-floris, rhachi et pedunculo minuto 2–6 mm. longis et pedicellis gracilibus 4–6 mm. longis aureo-puberulis; bracteis sericeis tripartitis, lamina oblonga acuta 0.5–1 mm. longa caduca, dentibus lateralibus basalibus inconspicuis persistentibus; sepalis 5 submembranaceis lanceolatis circiter 2×0.8 mm. acutis, extus minute sericeis, intus puberulis; petalis 5 membranaceis glabris obovatis, 1.8–2.3 mm. longis, 1.2–1.5 mm. latis, apice rotundatis vel truncatis et obscure crenulatis; disco 5-lobato, lobis carnosus oblongis 0.3–0.4 mm. diametro; staminibus 10–12, 1–1.2 mm. longis, filamentis glabris, antheris oblongis circiter 0.5 mm. longis ubique puberulo-setulosis; gynaecio glabro sub anthesi circiter 1.7 mm. longo, ovario subgloboso, stylo gracili 0.7–0.8 mm. longo obscure bifido, loculis 2 biovulatis.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, alt. 2300 m., *Brass 11056* (TYPE), Nov. 1938 (slender tree about 10 m. high, common in low substage of ridge-crest forests; flowers white).

Like *S. Ridleyana* (Wernh.) Schlechter and *S. Lamii* O. C. Schmidt, the new species has the combination of small leaves and a reduced number of stamens, although flowers of the present species appear to have 10, 11, or 12 stamens rather than a fixed number. When only 10 stamens are present, they are arranged opposite to and alternate with the disk-lobes, as described above for my new species *S. decandra*. When 11 or 12 stamens are present the arrangement is less regular, and apparently 1 or 2 of the disk-lobes subtend 3 stamens each—the more usual arrangement in the genus. *Sericolea Ridleyana* has foliage quite unlike that of the new species, but *S. Lamii* seems closer; from the latter *S. venusta* differs in its densely sericeous rather than glabrous lower leaf-surfaces and its more compact inflorescences with shorter pedicels. Species with foliage suggesting that of *S. venusta* but with 15 stamens are *S. novo-guineensis* Gibbs, *S. Gjellerupii* O. C. Schmidt, and *S. Pullei* (Lauterb.) Schlechter, all of which also differ from the new species in minor details of foliage and inflorescence.

***Sericolea floribunda* sp. nov.**

Frutex epiphyticus 3–4 m. altus copiose ramosus et foliatus, ramulis fuscis gracilibus, juventute parce argenteo-sericeis complanatis mox glabris et teretibus; foliis oppositis vel suboppositis, petiolis gracilibus 2–4 mm. longis inconspicue sericeis, laminis chartaceis subrigidis oblongo-lanceolatis, 4.5–7 cm. longis, 8–16 mm. latis, basi obtusis vel subacutis, apice in acuminem gracilem calloso-mucronulatum 1–2 cm. longum attenuatis, margine obscure spinuloso-serrulatis et anguste recurvatis, siccitate concoloribus, supra glabris subnitidis, subtus inconspicue et sparsim sericeo-puberulis, costa supra paullo subtus valde elevata, nervis secundariis obliquis utrinsecus 10–15 cum aliis interspersis et rete venularum utrinque prominulis; inflorescentiis axillaribus ubique floribus exceptis sericeo-puberulis demum subglabris, plerumque paniculatis, interdum racemosis, 1–2.5 cm. longis et latis 5–20-floris, pedunculo brevi ad 8 mm. longo paullo complanato, ramulis lateralibus plerumque 1–4, 1–6 mm. longis, 2–4-floris; bracteis tripartitis, lamina lanceolata ad 3 mm. longa paucidentata ubique sericea mox caduca, dentibus 2 basalibus subulatis subpersistentibus 0.5–0.8 mm. longis, bracteolis minutis; pedicellis gracilibus 3–7 mm. longis, floribus saepe nutantibus; sepalis 5 concavis oblongo-lanceolatis, 2.1–2.3 mm. longis, 0.8–1 mm. latis, acutis, extus sparse sericeis, intus obscure puberulis; petalis 5 submembranaceis glabris cuneato-obovatis, 2.5–3 mm. longis, 1.5–1.8 mm. latis, apice truncato-crenulatis, margine apicem versus saepe anguste involutis; disci lobis 5 distinctis glabris oblongo-subglobosis circiter 0.4 mm. diametro; staminibus modo vulgari generis 15, 1.3–1.5 mm. longis, filamentis gracilibus minute puberulis, antheris oblongis circiter 0.7 mm. longis ubique puberulo-setulosis; gynaecio glabro circiter 2 mm. longo, ovario ellipsoideo, stylo gracili ovarium subaequante obscure bifido, loculis 2 biovulatis; fructibus ellipsoideis maturitate circiter 5×3 mm., disco et stylo persistentibus, seminibus magnis ad 1 vel 2 saepe reductis.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1200 m., *Brass 12862* (TYPE), Feb. 1939 (common epiphytic "tree" 3–4 m. high; leaf-blades glaucous beneath; flowers yellow-green).

Sericolea floribunda is the only species of the genus thus far described as having a panicle inflorescence, with lateral few-flowered branches toward the base; for all other species a simple raceme is indicated. The relationship of the new species appears to be with *S. glabra* Schlechter and *S. salicina* Schlechter, both rather inadequately described species, which are said to have 4-ovulate ovary-locules and few-flowered racemose inflorescences.

***Sericolea Brassii* sp. nov.**

Arbor gracilis 5-7 m. alta, ramulis gracilibus purpurascentibus vel cinereis, juventute complanatis, novellis aureo-sericeo-puberulis; foliis oppositis vel suboppositis, petiolis mox glabris gracilibus canaliculatis 4-6 mm. longis, laminis chartaceis oblongis, 5.5-10 cm. longis, 1.5-3 cm. latis, basi obtusis, apice in acuminem calloso-subulatum 1-2 cm. longum gradatim angustatis, margine dentibus spinulosis 2 vel 3 per centimetrum praeditis, supra glabris, subtus pallidioribus inconspicue pallido-sericeis mox glabrescentibus, costa supra elevata subtus prominente, nervis secundariis rectis obliquis utrinsecus circiter 20 cum aliis debilioribus interspersis et rete venularum intricato utrinque valde prominulis; inflorescentiis axillaribus breviter racemosis 4-7-floris, rhachi pedicellisque sericeo-puberulis, pedunculo brevi 1-2 mm. longo, rhachi 2-6 mm. longa, pedicellis gracilibus 7-9 mm. longis; bracteae papyraceae utrinque sericeae lanceolatis 2-3 mm. longis mox caducis, dentibus 2 basalibus subulatis circiter 0.5 mm. longis subpersistentibus; sepalis 5 papyraceis oblongo-lanceolatis, 3-3.5 mm. longis, 1.2-1.3 mm. latis, acutis, utrinque obscure sericeo-puberulis, intus leviter carinatis; petalis 5 glabris submembranaceis obovatis, sepala longitudine subaequantibus, 1.7-2 mm. latis, apice truncatis et irregulariter 3- vel 4-crenulatis; disco annulari-pulvinato continuo circiter 0.4 mm. alto leviter crenulato; staminibus 15 (5 quam aliis paullo longioribus) 0.8-1 mm. longis, filamentis gracilibus glabris, antheris oblongis 0.5-0.6 mm. longis ubique obscure puberulo-setulosis; gynaeceo glabro sub anthesi circiter 2.5 mm. longo, ovario subgloboso, stylo crasso circiter 1 mm. longo obscure bifido, loculis 2 biovulatis.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12709 (TYPE), Feb. 1939 (slender tree 5-7 m. high, common in open situations in mossy-forest; leaf-blades very glaucous beneath; flowers white).

Sericolea Brassii is apparently closely related only to *S. calophylla* (Ridley) Schlechter, with which it has in common oblong leaves which are thinly pubescent beneath and comparatively broad for the genus. The original description of that species (as *Pyrsonota calophylla* Ridley, in Trans. Linn. Soc. II. Bot. 9: 40. 1916) and the illustration (loc. cit. *pl.* 3, *f.* 48-54) do not agree in all details, but from them one can obtain a fairly accurate idea of Ridley's plant. The new species appears to differ from *S. calophylla* in its larger bracts, longer pedicels, broader petals, continuous rather than 5-lobed disk, shorter stamens, and glabrous rather than pilose gynaeceum. The leaves of *S. calophylla* are portrayed as up to 7.3×2.3 cm., somewhat larger than described; those of *S. Brassii* are often still larger.

Sericolea lanata sp. nov.

Arbor 7 m. alta, ramulis juventute complanatis dense aureo-sericeis mox subteretibus glabris purpurascens; foliis oppositis vel suboppositis, petiolis primo sericeis mox glabris canaliculatis 3–5 mm. longis, laminis rigidis coriaceis ovato-ellipticis, (3–)5–7.5 cm. longis, (1.5–)2–3.5 cm. latis, basi late obtusis vel subrotundatis, apice in acuminem callosum ad 1 cm. longum abrupte angustatis, margine dentibus spinulosis inconspicue crenulato-serratis, supra glabris siccitate olivaceis, subtus tomento aureo-arachnoideo-lanato densissime indutis, costa supra impressa subtus prominente, nervis secundariis utrinsecus 15–25 patentibus supra obscuris vel paullo prominulis subtus elevatis, rete venularum intricato supra leviter prominulo subtus tomento occulto; inflorescentiis in axillis foliorum solitariis vel binis racemosis 2–6-floris, rhachi pedicellisque crispato-pilosis, pedunculo brevi et rhachi 1–10 (raro sub fructu ad 20) mm. longis, pedicellis gracilibus sub anthesi 4–6 mm. sub fructu ad 14 mm. longis; bracteis lanceolatis circiter 2.5 mm. longis sericeo-puberulis caducis, dentes 2 breves subulatos basales subpersistentes gerentibus; sepalis 5 submembranaceis oblongo-lanceolatis, circiter 2.5 mm. longis, 0.8–1.2 mm. latis, acutis, extus dense tomentellis, intus obscure puberulis et carinatis; petalis 5 membranaceis glabris late cuneatis, 2.5–3 mm. longis, 1.7–2.5 mm. latis, plerumque apice profunde 3-lobatis; disco 5-lobato, lobis carnosus oblongis circiter 0.4 mm. altis et 0.5–0.6 mm. latis emarginatis, sub fructu in pulvino crenulato persistente subcontinuis; staminibus 10 vel 11 ubique minute puberulo-setulosis, 0.8–1.2 mm. longis, filamentis gracilibus, antheris oblongis circiter 0.5 mm. longis; gynaeceo glabro sub anthesi circiter 2 mm. longo, ovario subgloboso, stylo gracili ovarium subaequante obscure bifido, loculis 2 quadriovulatis; fructibus subglobosis carnosus maturitate circiter 5 mm. diametro, seminibus magnis ad 1 vel 2 saepe reductis obovoideis levibus.

NETHERLANDS NEW GUINEA: 18 km. southwest of Bernhard Camp, Idenburg River, alt. 2150 m., *Brass* 12676 (TYPE), Feb. 1939 (tree 7 m. high, uncommon in mossy-forest substage; leaves stiff, convex; flowers white; fruit fleshy, black).

Sericolea lanata, in its beautifully golden-arachnoid-lanate lower leaf-surfaces, suggests *S. chrysotricha* Schlechter, which has much narrower, lanceolate, long-acuminate leaf-blades and flowers with 15 stamens. *Sericolea calophylla* (Ridley) Schlechter agrees with the new species in general leaf-shape and size but has the leaf-blades less densely pilose, with longer tips and coarser denticulation, while its stamens are also 15. The broad and deeply lobed petals further characterize *S. lanata*. From all other described species of *Sericolea* the new species differs in numerous and obvious characters of leaf-size, shape, and pubescence. As only a few flowers are available, the variation in number of stamens of *S. lanata* needs to be checked; apparently 10 is the normal number, but sometimes an extra one is found.

A fruiting specimen which is very probably conspecific with *S. lanata* is *Clemens* 6277, from the Busu River, Morobe District, Northeastern New Guinea, alt. 2100–2400 m.

Sericolea Gaultheria (F. v. Muell.) Schlechter in Bot. Jahrb. **54**: 100. 1916, in Rep. Sp. Nov. **16**: 31. 1919.

Aristotelia Gaultheria F. v. Muell. in Jour. Bot. **29**: 176. 1891.

BRITISH NEW GUINEA: Wharton Range, Central Division: Neon Basin, alt. 3200 m., *Brass* 4501 (A, NY) (compact tree 4–5 m. high, very common in forest patches; leaf-blades dark green and shining above, glaucous beneath; petals yellow; disk red; fruit pale green, flecked with red, about 6 mm. diam.); Murray Pass, alt. 2840 m., *Brass* 4504 (A, NY), 4665 (A, NY) (compact trees 5–8 m. high, very common in forest; leaf-blades dark green above, silver-gray beneath, the petiole red; flowers yellow or cream-colored; fruit reddish brown to black, 4–7 mm. diam.).

The cited specimens appear almost certainly to represent *S. Gaultheria*, the type of which was collected on the summit of Mt. Yule, not far from the above localities. This is the only species of *Sericolea* thus far described from British New Guinea; Mueller has also mentioned *Aristotelia papuana* F. v. Muell. (in Southern Science Record **1**: 150, nomen. 1881, Pap. Pl. **2**: 5, nomen. 1885), which Schlechter (in Bot. Jahrb. **54**: 155. 1916) suggests may possibly be identical with *S. Gaultheria*. While this may be true, Mueller's two names are based on different types.

The Brass specimens may be confidently excluded from all other species of *Sericolea* except *S. Gaultheria*, the original description of which is too generalized to permit absolute identification. The leaves of Mueller's species are said to be " $\frac{1}{2}$ –2 in. long," while the Brass specimens have leaf-blades 2.5–4 cm. long and 7–15 mm. broad. The pedicels of *S. Gaultheria* are said to be double or triple the length of the sepals, which are "hardly $\frac{1}{8}$ in. long." On *Brass* 4501, which probably best agrees with the description in this respect as well as in its "leaves . . . gradually much contracted into an acute apex," the pedicels are 5–7 mm. long and the sepals 2.5–3 mm. long. Numbers 4504 and 4665 have the pedicels 10–16 mm. long and the sepals 3.5–4 mm. long. In spite of these and other minor differences among the three collections cited, I am confident that only one species, of reasonable variability, is represented.

Aceratium DC.

In his discussion of *Aceratium*, Schlechter (in Bot. Jahrb. **54**: 100–107. 1916) recognized 13 species, of which 11 are from New Guinea, one from the New Hebrides, and one from Amboina; in 1918 (in Bot. Jahrb. **55**: 194) he transferred one of Ridley's New Guinean species of *Elaeocarpus* to *Aceratium*. To this number, C. T. White (in Kew Bull. **1932**: 42–43. 1932) added three species from Queensland, so that the genus is now composed of 17 species. In Schlechter's original treatment, three of the New Guinean species are listed as "ined." and references are given to an unpublished number of Nova Guinea. In these three cases types are cited and brief notes are given, the species also being placed in a key; therefore one may consider them validly published. Since type material of these three species is available to me, I give more detailed descriptions of them below. Seven species from New Guinea, one from the Kai Islands, and one from the Solomon Islands are here proposed as new.

Although Schlechter states that the ovary of *Aceratium* is usually 4-locular and only rarely 3-locular, considerable latitude in this character is found. *Aceratium Branderhorstii*, for instance, may have the ovary-locules 3, 4, or 5 on the same plant; *A. sericeum* has only 2 or 3 ovary-locules, while

several other species have 3 locules more or less consistently. In fruit some species, such as *A. erythrocarpum* and *A. Archboldianum*, appear to have unilocular pyrenes.

Aceratium parvifolium Schlechter in Bot. Jahrb. 54: 102. 1916.

NETHERLANDS NEW GUINEA: Parameles Mountains, alt. about 1100 m., *Pulle 561* (TYPE COLL.), Dec. 1912 (tree 4 m. high, in primary forest).

Since Schlechter's original publication of this binomial is accompanied by only a few preliminary notes, a description based on an isotype is herewith offered. Mature flowers are not available to me, but the species is very distinct from others of the genus on the basis of its small leaf-blades with fine and copious serrulations; the inflorescence is very slender, and apparently the flowers will prove to be small for the genus.

Arbor gracilis ad 4 m. alta, ramulis subteretibus primo dense cinereo-sericeo-strigosis demum glabris; foliis oppositis, petiolis gracilibus 2–3 mm. longis evanescenter pilosis, laminis papyraceis in sicco fusciscentibus anguste ovato-lanceolatis, 5–6.5 cm. longis, 1.3–1.7 cm. latis, basi late obtusis, apice in acuminem ad 1 cm. longum obtusum calloso-apiculatum serrulatum gradatim attenuatis, margine copiose mucronulato-serrulatis (dentibus 8–10 per centimetrum), supra costa sericeo-puberula excepta mox glabris, subtus plus minusve persistenter brunneo-strigosis, costa nervisque lateralibus utrinsecus 10–15 leviter arcuatis supra paullo subtus valde elevatis, rete venularum intricato utrinque prominulo vel supra subplano; inflorescentiis breviter racemosis 3–6-floris, pedunculo et rhachi gracillimis ad 16 mm. longis cum pedicellis puberulis glabris, bracteis lanceolatis acutis ad 2 mm. longis mox caducis, pedicellis gracilibus ad 25 mm. longis; floribus maturis non visis; sepalis 5 submembranaceis oblongo-lanceolatis alabastro ad 15 × 1.5 mm., apice subacutis, utrinque puberulis glabrisque, intus basim versus sericeis et carinatis; petalis 5 membranaceis anguste oblongo-cuneatis (ad 2 cm. longis ex Schlecht.), apice 5–7-lobatis (dentibus saepe emarginatis, segmentis obtusis), intus basim versus et margine copiose pallido-tomentellis; disco pulvinato stramineo-hispidulo; staminibus 15 quam gynaecio brevioribus, filamentis filiformibus hispidulis, antheris oblongis alabastro 2–2.5 mm. longis copiose setulosis et apice pilis stramineis 0.5–0.7 mm. longis hispidis; gynaecio quam petalis breviori, ovario pallide sericeo-hispidulo 3-loculari (unico dissecto), ovulis 6 in quoque loculo, stylo subulato inferne hispidulo superne glabro.

Aceratium erythrocarpum sp. nov.

Arbor ad 25 m. alta, ramulis gracillimis teretibus primo inconspicue strigosis cito glabris cinereisque; foliis oppositis vel suboppositis raro subalternatis, petiolis gracilibus semiteretibus 2–4 mm. longis breviter strigosis demum glabrescentibus, laminis chartaceis oblongo-lanceolatis, (4–)5–8.5 cm. longis, 1.2–2.2 cm. latis, basi subacutis vel obtusis, apicem versus gradatim angustatis, apice ipso obtusis et mucronulatis, margine integris et paullo incrassatis vel anguste revolutis, supra viridibus praeter costam et marginem interdum strigosos glabris, subtus glaucis costa nervisque pilis ad 1 mm. longis laxe strigosis alibi glabris, costa utrinque elevata, nervis lateralibus utrinsecus 6–10 arcuato-adscendentibus supra paullo subtus valde prominulis, venulis transversis numerosis anastomosantibus utrinque leviter prominulis; inflorescentiis sub fructu ut videtur breviter racemosis,

rhachi pedicellisque pilis brunneis 0.5–1 mm. longis persistenter strigosis, rhachi brevi, bracteis minutis, pedicellis gracilibus sub fructu 8–12 mm. longis; calyce sub fructu subpersistente, sepalis 5 lanceolatis circiter 8 mm. longis et 1 mm. latis extus copiose strigosis intus puberulis; fructibus ut videtur subglobosis, maturitate ad 2.3 cm. diametro, basi et apice rotundatis, apice stylo gracili basim versus minute hirtello circiter 8 mm. longo subpersistenter coronatis; pericarpio crasso fibroso demum profunde et copiose fisso, endocarpio osseo 2–3 mm. crasso, pyrena uniloculari (dissolutione dissepimentorum?).

BRITISH NEW GUINEA: Fly River region, Palmer River, 2 miles below junction with Black River, alt. 100 m., *Brass* 7141 (TYPE), June 1936 (common sub-canopy tree of lower ridges, attaining 25 m. in height; trunk spurred or with prop-roots; leaf-blades gray beneath; fruit red, fleshy).

Among described species, *A. erythrocarpum* is close only to *A. parvifolium* Schlechter, from which it differs in its entire leaf-blades, which are distinctly glaucous beneath, essentially glabrous except on the veins, and have only 6–10 lateral nerves. Although the new species bears fruits, its inflorescence seems more compact than that of *A. parvifolium* and has shorter pedicels.

Aceratium Branderhorstii Schlechter in Bot. Jahrb. 54: 102. 1916.

NETHERLANDS NEW GUINEA: Kampong Kabatiel [near Okaba, south coast near boundary of British New Guinea], *Branderhorst* 269 (TYPE COLL.). BRITISH NEW GUINEA: Western Division: Gaima, lower Fly River (east bank), *Brass* 8341 [det. R. Knuth] (attractive virgate tree to 10 m. high, in light rain-forest; fruit red, acidulous, eaten by natives; native name: *posesi*); Lake Daviumbu, middle Fly River, *Brass* 7466 [det. R. Knuth] (profusely flowering virgate tree 7–8 m. high, common in rain-forest substage; leaf-blades silky brown-pubescent beneath; flowers pale yellow); Wuoi, Oriomo River, alt. 20 m., *Brass* 5886 (NY) (twiggy tree 3 m. high, rare in savanna forest; leaf-blades gray beneath; fruit pale yellow, with a glaucous bloom).

This is one of the species which Schlechter published with only preliminary notes. In view of the fact that ample material is now available, a complete description is herewith offered. *Brass* 7466 is in flower, while *Brass* 5886 and 8341 and the type collection are in fruit.

Arbor ad 10 m. alta, ramulis gracilibus teretibus juventute ferrugineo-vel cano-tomentellis demum glabris; foliis oppositis vel suboppositis, petiolis gracilibus ut ramulis juvenilibus tomentellis vel pilosis 3–5 mm. longis, laminis chartaceis oblongo-ellipticis, 5–7.5 cm. longis, (1.5–)2–4 cm. latis, basi late obtusis vel subrotundatis, apice cuspidatis vel acuminatis et callosopapiculatis, margine subintegris apicem versus obscure mucronato-serrulatis, supra viridibus costa interdum strigoso-puberula excepta glabris, subtus pallidioribus primo dense sericeis demum pilis canescentibus laxè pilosis, costa supra prominula subtus valde elevata, nervis lateralibus utrinsecus 7–10 arcuatis cum rete venularum inconspicuo supra subplanis subtus leviter prominulis; inflorescentiis breviter racemosus 2–6-floris, rhachi gracili 5–10 mm. longa et pedicellis pilis 0.5–0.8 mm. longis canescentibus pilosis, bracteis anguste oblongis pilosis 2–3 mm. longis, pedicellis gracillimis 8–12 mm. longis; sepalis 5 oblongo-lanceolatis, 9–10 mm. longis, 2–2.5 mm. latis, apicem subacutum gradatim angustatis, extus ut pedicellis pallide et dense pilosis, intus obscure puberulis et basim versus carinatis; petalis 5 membranaceis oblongo-cuneatis, 11–15 mm. longis, 5–6 mm. latis,

apice dentibus 4 vel 5 inaequalibus 1–2 mm. longis saepe 2–4-lobatis laciniatis, intus basim versus et margine copiose tomentellis; disco annulari-pulvinato circiter 0.7 mm. alto et crasso dense hispidulo-piloso; staminibus 15 quam gynaecio brevioribus, filamentis gracilibus filiformibus glabris 6–7 mm. longis, antheris oblongis 2.7–3 mm. longis ubique minute setoso-puberulis et apice pilis 0.3–0.5 mm. longis ciliato-hispidis; gynaecio sub anthesi 11–12 mm. longo, ovario ovoideo dense stramineo-piloso 3–5-loculari, ovulis plerumque 10 pendulis biseriatis in quoque loculo, stylo subulato apicem minute 3–5-fidum attenuato basim versus puberulo distaliter glabro 8–9 mm. longo; fructibus elongato-ovoideis maturitate glabris 20–30 mm. longis et 9–15 mm. latis, inconspicue 3–5-angulatis, basi rotundatis, apicem versus angustatis et basi styli puberulo saepe coronatis; pericarpio (mesocarpio fibroso et endocarpio osseo inclusis) 1–4 mm. crasso, pyrena 3–5-loculari.

***Aceratium sericeum* sp. nov.**

Arbor ad 23 m. alta, ramulis juventute subcomplanatis ferrugineo-sericeis demum teretibus glabris; foliis oppositis vel suboppositis, petiolis gracilibus leviter canaliculatis sericeis 3–5 mm. longis, laminis chartaceis in sicco subrigidis fusciscentibus elliptico- vel lanceolato-oblongis, 5–8.5 cm. longis, 1.5–3 cm. latis, basi late obtusis vel subrotundatis, apice gradatim acuminiatis (acumine circiter 1 cm. longo callosomucronulato), margine apiculato-serrulatis (dentibus 3–5 per centimetrum), supra costa interdum breviter strigosa excepta glabris, subtus dense et persistenter aureo-sericeis, costa supra leviter subtus valde prominente, nervis lateralibus utrinsecus 10–14 leviter curvatis utrinque cum rete venularum intricato prominulis (venulis tomento subtus interdum obscuris); inflorescentiis racemosis 2–7-floris, pedunculo et rhachi ad 32 mm. longis pedicellisque pilis 0.5–0.8 mm. longis sericeis demum subglabrescentibus, bracteis parvis mox caducis, pedicellis gracilibus sub anthesi 5–12 mm. longis; sepalis 5 raro 4 lanceolatis, 11–13 mm. longis, 1.5–2.5 mm. latis, apicem acuminatum gradatim angustatis, extus dense sericeis, intus sericeo-puberulis et obscure carinatis; petalis 5 raro 4 membranaceis anguste cuneatis, 15–20 mm. longis, 5–6.5 mm. latis, apice dentibus 4–7 inaequalibus 1.5–3 mm. longis et saepe 2- vel 3-lobatis laciniatis, intus basim versus et margine involuto dense tomentellis; disco pulvinato 0.5–1 mm. alto dense aureo-hispido; staminibus 15 (12 in floribus 4-meris) quam gynaecio brevioribus, filamentis filiformibus ubique breviter setulosus 6–7 mm. longis, antheris oblongis 2.7–3 mm. longis ubique setulosopuberulis et apice pilis 0.3–0.5 mm. longis ciliato-hispidis; gynaecio sub anthesi 12–13 mm. longo, ovario dense sericeo 2- vel 3-loculari, ovulis plerumque 6 in quoque loculo, stylo subulato 9–10 mm. longo basim versus sericeo distaliter glabro apice minute 2- vel 3-fido; fructibus anguste ovoideis immaturis ad 15 mm. longis et 6 mm. latis, plus minusve pilosis, inconspicue angulatis, basi obtusis vel subrotundatis, apice stylo piloso coronatis; pericarpio plus minusve tenui, mesocarpio haud fibroso, endocarpio osseo, pyrena 2- vel 3-loculari, dissepimentis mox evanescentibus.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1150–1200 m., *Brass* 12539 (TYPE), Feb. 18, 1939 (frequent tree of primary forest, 23 m. high, on a ridge; trunk 43 cm. diam.; bark 8 mm. thick, gray; wood light brown; crown small; flowers red), *Brass* 12539A (frequent tree of secondary forest, on the slope of a ridge; fruiting material of no. 12539), *Brass* 12810 (rain-forest substage tree 12 m. high, with immature fruit).

Aceratium sericeum is most closely related, among described species, to *A. Branderhorstii* Schlechter, but the two are readily separated by several important characters which may best be summarized in a key:

Leaf-blades at length spreading-pilose with grayish hairs, the margin entire, obscurely mucronulate-serrulate only toward apex; peduncle and rachis 5–10 mm. long; pedicels, sepals, and ovary spreading-pilose with pale nearly colorless hairs; sepals 9–10 mm. long, subacute at apex; petals 11–15 mm. long; filaments glabrous; ovary-locules 3–5, the ovules usually 10 per locule. *A. Branderhorstii*.

Leaf-blades persistently golden-sericeous beneath, the margin apiculate-serrulate throughout; peduncle and rachis up to 32 mm. long; pedicels, sepals, and ovary sericeous with appressed golden-brown hairs; sepals 11–13 mm. long, acuminate at apex; petals 15–20 mm. long; filaments short-setulose; ovary-locules 2 or 3, the ovules usually 6 per locule. *A. sericeum*.

Although *A. sericeum* resembles *A. parvifolium* Schlechter in leaf-shape and margins, it differs markedly in pubescence and in its much larger flowers, to such a degree that the relationship appears only distant.

***Aceratium Brassii* sp. nov.**

Arbor ad 20 m. alta ut videtur copiose ramulosa, ramulis validis juvenile brunneo-strigoso-puberulis cito glabris cinereisque; foliis oppositis vel suboppositis, petiolis gracilibus canaliculatis puberulis 6–10 mm. longis, laminis chartaceo-coriaceis in sicco fusco-olivaceis oblongo-ellipticis, 5–8.5 (–10) cm. longis, 2–3.5 cm. latis, basi obtusis, apice cuspidatis et callosomucronulatis, margine integris apicem versus interdum obscure crenulatis, supra costa strigosa excepta glabris, subtus glaucis ut videtur farinoso-ceriferis et pilis 0.5–0.8 mm. longis laxe pilosis, costa supra elevata subtus prominente, nervis lateralibus utrinsecus 6–9 curvatis marginem versus anastomosantibus supra prominulis subtus valde elevatis, rete venularum copioso intricato utrinque prominulo; inflorescentiis axillaribus breviter racemosis 2–7-floris, pedunculo brevi et rhachi crassis leviter angulatis ad 2 cm. longis cum pedicello bracteisque dense pallide brunneo-tomentellis, bracteis oblongis obtusis 1.5–3 mm. longis mox caducis, pedicellis crassis circiter 1.5 mm. diametro sub anthesi 7–12 mm. longis; sepalis 5 carnosis oblongo-lanceolatis, 12–16 mm. longis, 3–5 mm. latis, apice subacutis vel obtusis, extus puberulis, intus sericeo-puberulis et carinatis; petalis 5 tenuiter carnosis anguste obovato-cuneatis, 20–26 mm. longis, 8–10 mm. latis, apice irregulariter 2–5-lobatis (dentibus obtusis 1.5–3 mm. longis saepe sinuato-lobulatis), intus basim versus et margine copiose aureo-sericeo-tomentellis; disco inconspicue pulvinato circiter 1 mm. alto hispido-setoso; staminibus 15 quam gynaecio brevioribus, filamentis validis teretibus 7.5–10 mm. longis conspicue setulosis, antheris oblongis 4–6 mm. longis ubique setulosis et apice pilis circiter 0.8 mm. longis hispido-ciliatis; gynaecio sub anthesi 17–21 mm. longo, ovario subgloboso pilis stramineis 1.5–2 mm. longis copiose hispido-strigoso 4- vel 5-loculari, ovulis 8–10 in quoque loculo pendulis biseriatis; stylo 13–17 mm. longo basim versus setoso et crasso superne glabro et angustato apice obscure 4- vel 5-fido.

NETHERLANDS NEW GUINEA: 6 km. southwest of Bernhard Camp, Idenburg River, alt. 1250–1300 m., *Brass* 13016 (subsidiary tree 20 m. high, in rain-forest; leaf-blades glaucous beneath; petals pink, tinged with red), *Brass* 13024 (TYPE), March 1939 (profusely flowering subsidiary tree 15 m. high, in rain-forest of slopes; leaf-blades gray beneath; flowers red).

Closely related only to *A. Branderhorstii* Schlechter and *A. sericeum* (above-described), *A. Brassii* sharply differs from both in many characters, most obvious of which are its longer petioles, thicker leaf-blades with more pronounced veinlets, stouter inflorescences, much broader and thicker sepals, larger petals, longer filaments and anthers, and more copiously hispid ovary.

***Aceratium gracile* sp. nov.**

Arbor ad 15 m. alta, ramis gracilibus pendulis, ramulis dense foliatis apicem versus leviter complanatis cinereo-tomentellis demum teretibus glabrisque; foliis oppositis vel suboppositis, petiolis gracilibus semiteretibus cano-sericeo-puberulis 2-4 mm. longis, laminis chartaceis oblongo-lanceolatis, 6-11 cm. longis, (1.5-)2-3.5 cm. latis, basi late obtusis, apice cuspidatis vel gradatim acuminatis et calloso-mucronulatis, margine apiculato-serrulatis (dentibus 4 vel 5 per centimetrum), supra costa strigoso-puberula excepta glabris, subtus pallidioribus et dense stramineo-sericeis, costa utrinque valde elevata, nervis lateralibus utrinsecus 7-10 adscendentibus leviter curvatis supra subplanis subtus elevatis, rete venularum inconspicue laxo utrinque plano vel leviter prominulo; inflorescentiis breviter racemosis 2-7-floris, pedunculo brevi et rhachi gracilibus 2-8 mm. longis pedicellisque pilis 0.3-0.5 mm. longis laxe pilosis, bracteis oblongis minutis caducis, pedicellis gracillimis sub anthesi 5-12 mm. longis; sepalis 5 submembranaceis oblongo-lanceolatis, 10-11 mm. longis, 2-2.5 mm. latis, apice subacutis, utrinque pallide sericeo-puberulis, intus carinatis; petalis 5 membranaceis anguste oblongo-cuneatis, 13-17 mm. longis, 3.5-5 mm. latis, apice dentibus 4-6 obtusis interdum bilobatis 1-2 mm. longis laciniatis, intus basim versus et margine copiose puberulis; disco pulvinato circiter 0.7 mm. alto dense setuloso-puberulo; staminibus 15 quam gynaecio brevioribus, filamentis filiformibus sparsissime setulosis 5-6 mm. longis, antheris anguste oblongis 2-2.3 mm. longis ubique setulosis et apice pilis 0.3-0.4 mm. longis copiose hispidis; gynaecio sub anthesi 12-15 mm. longo, ovario anguste ovoideo pallide hispidulo 4-loculari, ovulis 8 in quoque loculo, stylo subulato 9-11 mm. longo infra medium hispidulo-puberulo superne glabro ut videtur obscure 4-fido.

NETHERLANDS NEW GUINEA: 4 km. southwest of Bernhard Camp, Idenburg River, alt. 850 m., *Brass 13208* (TYPE), March 1939 (tree 15 m. high, on bank of a rain-forest stream; trunk 30 cm. diam.; branches slender, long, drooping; flowers profuse, the petals brownish pink).

Aceratium gracile is most closely related to *A. Branderhorstii* Schlechter and the two new species described above, differing from all of these in several minor characters of pubescence and dimensions. It has more slender flowers, with narrower petals and shorter anthers, than any of its immediate allies. In its serrulate leaf-margin, *A. gracile* is suggestive of *A. sericeum*, the leaves of which have more conspicuous veinlets and a brighter tomentum beneath. Compared with *A. sericeum*, the new species has a shorter rachis, brownish pink rather than red petals, a more closely pilose disk, and an ovary which is hispid rather than sericeous.

***Aceratium angustifolium* sp. nov.**

Frutex robustus virgatus vel arbor parva, ramulis juvenilibus complanatis

inconspicue et pallide strigoso-puberulis demum teretibus glabrescentibus; foliis oppositis, petiolis gracilibus semiteretibus 2–4 mm. longis sericeo-strigulosis, laminis papyraceis in sicco brunescentibus anguste oblongo-ellipticis, 6–9 cm. longis, 1.5–3 cm. latis, basi subacutis vel obtusis, apice gradatim breviter acuminatis et calloso-apiculatis, margine subintegris sub lente mucronulato-crenulatis (dentibus circiter 4 per centimetrum), supra costa puberula excepta glabris, subtus pallidioribus pilis 0.7–1 mm. longis cano-albidis sericeo-pilosis, costa supra leviter subtus valde elevata, nervis lateralibus utrinsecus 6–11 erecto-patentibus supra subplanis subtus prominulis, rete venularum inconspicuo; inflorescentiis compactis breviter racemosis ut videtur circiter 4-floris, pedunculo et rhachi sub fructu ad 6 mm. longis pallide aureo-sericeis, bracteis minutis, floribus non visis; pedicellis sub fructu gracilibus 7–12 mm. longis puberulis; fructibus obscure sericeo-puberulis cito glabris conico-ovoideis, ut videtur maturitate 15–20 mm. longis et 9–13 mm. latis, inconspicue angulatis, basi latioribus et truncato-rotundatis, deinde ad apicem acutum basi styli coronatum gradatim angustatis; pericarpio (mesocarpio fibroso et endocarpio osseo inclusis) in sicco 1–2 mm. crasso, in vivo carnosio crassiore, pyrena 3-loculari, dissepimentis validis persistentibus.

BRITISH NEW GUINEA: Eastern Division, U-uma River, alt. 300 m., *Brass 1518* (TYPE), May 20, 1926 (large virgate bush or small tree, on river bank; leaf-blades thin, soft, paler beneath; fruit fleshy, solitary in leaf-axils).

Aceratium angustifolium, belonging to the group of *A. Branderhorstii* Schlechter, differs from that species in its proportionately narrower and shorter-petiolate leaf-blades and its shorter, more distinctly conical fruit, of which the base is more definitely truncate. The relationship of *A. angustifolium* to the other relatives of *A. Branderhorstii* described above is more remote. It is to be expected that floral characters will serve further to differentiate *A. angustifolium*.

The only other species of *Aceratium* thus far described from the eastern part of British New Guinea is *A. Muellermanum* Schlechter (*Elaeocarpus edulis* sensu F. v. Muell. in Jour. Bot. **31**: 321. 1893, non Teys. & Binn.), based on *Forbes 295, 705, and 896*, from Sogere. *Aceratium Muellermanum* is said to have leaf-blades up to 15×6.5 cm. ($6 \times 2\frac{1}{2}$ inches), indicating that it is not close to *A. angustifolium*. It should be noted that *A. ochraceum* (Ridley) Schlechter (based on *Elaeocarpus ochraceus* Ridley) has even larger leaves; this is probably distinct from *A. Muellermanum*, in spite of Ridley's statement (in Trans. Linn. Soc. II. Bot. **9**: 22. 1916) that "Forbes's nos. 295 and 580, from British New Guinea, seem to be the same species."

Aceratium Clemensiae sp. nov.

Frutex vel arbor parva, ramulis gracilibus apicem versus subcomplanatis sparse brunneo-sericeo-puberulis demum teretibus glabris; foliis oppositis vel suboppositis, petiolis gracilibus circiter 2 mm. longis hispidulo-puberulis, laminis chartaceis anguste ovato-oblongis, 4–6.2 cm. longis, 1.5–2.2 cm. latis, basi rotundatis et minute cordatis, apice obtuse cuspidatis et calloso-apiculatis, margine mucronulato-serrulatis (dentibus 4 vel 5 per centimetrum), supra costa obscure puberula excepta glabris, subtus molliter et pallide sericeo-tomentellis, costa supra leviter subtus valde elevata, nervis

lateralibus utrinsecus 8–12 erecto-patentibus supra cum rete venularum prominulis subtus elevatis, venulis subtus indumento obscuratis vel paullo prominulis; inflorescentiis racemosis ut videtur 4–6-floris, pedunculo et rhachi sub fructu 8–15 mm. longis cum pedicellis pallide puberulis, pedicellis sub fructu gracilibus 10–17 mm. longis; fructibus glabris oblongo-ellipsoideis, ut videtur maturitate 15–18 mm. longis et 8–12 mm. latis, inconspicue angulatis, basi obtusis, apice basi styli coronatis et subacutis (stylo subpersistente subulato 9–11 mm. longo inferne copiose puberulo superne glabro): pericarpio in sicco 2–4 mm. crasso, mesocarpio fibroso, endocarpio osseo, pyrena 3-loculari, dissepimentis validis persistentibus.

NORTHEASTERN NEW GUINEA: Morobe District, vicinity of Bulung River, alt. 900–1500 m., *Clemens 5192* (TYPE), Jan. 28, 1937 (shrub or small tree, in open woods; fruit red when mature).

Like the several species described above, the new species is a member of the small-leaved group composed of *A. Branderhorstii* Schlechter and its allies. *Accratium Clemensiae* differs from its relatives in its rounded and faintly cordate leaf-bases. The only other species of this alliance with such conspicuously serrulate leaf-margins are *A. parvifolium* Schlechter, *A. sericeum*, and *A. gracile*, but these all have obtuse leaf-bases and other differentiating characters of foliage and pubescence. The fruits of *A. Clemensiae*, apparently mature, are small for the genus and oblong-ellipsoid rather than ovoid or subconical, the more usual shape in *Aceratium*.

***Aceratium dasyphyllum* sp. nov.**

Arbor ut videtur gracilis, ramulis gracillimis juvenilibus subcomplanatis aureo-sericeo-puberulis demum teretibus glabris; foliis oppositis vel suboppositis, petiolis gracilibus subteretibus 3–5 mm. longis ut ramulis subsericeis, laminis chartaceis vel papyraceis in sicco fusciscentibus oblongo-ellipticis, 6–10 cm. longis, 2.5–4 cm. latis, basi obtusis vel subacutis, apice cuspidatis vel in acuminem ad 1 cm. longum calloso-apiculatum abrupte angustatis, margine subintegris interdum apicem versus obscurissime apiculato-crenulatis, supra glabris vel costa puberulis, subtus inconspicue pallido-sericeis, costa supra leviter subtus valde elevata, nervis lateralibus utrinsecus 7 vel 8 subrectis adscendentibus cum rete venularum supra paullo subtus valde prominulis; inflorescentiis breviter racemosis paucifloris, pedunculo et rhachi gracilibus ad 5 mm. longis (vel longioribus?) pedicellisque hirsuto-puberulis glabris, pedicellis gracillimis sub anthesi 10–15 mm. longis; sepalis 5 tenuiter carnosius anguste oblongo-lanceolatis, 14–18 mm. longis, 2.5–3 mm. latis, apice subacutis, utrinque inconspicue puberulis, intus carinatis; petalis 5 submembranaceis anguste oblongo-cuneatis, 17–21 mm. longis, 5–9 mm. latis, apice copiose irregulariter laciniatis (dentibus 12–16 angustis obtusis 1.5–3 mm. longis saepe crenulato-emarginatis), intus basim versus et margine stramineo-tomentellis; disco pulvinato circiter 1 mm. alto pilis pallidis circiter 0.3 mm. longis hispidulo; staminibus 15 quam gynaeceo brevioribus, filamentis filiformibus pallide setulosis vel glabris, antheris oblongis 3–4 mm. longis ubique minute setulosis apice pilis 0.2–0.3 mm. longis stramineo-hispidis; gynaeceo sub anthesi 13–15 mm. longo, ovario dense pallido-sericeo 4-loculari, ovulis in quoque loculo 10–12, stylo subulato 10–12 mm. longo basim versus hispidulo-puberulo superne glabro apice obscure 4-fido.

KAI ISLANDS: *Collector unknown* (TYPE), cultivated in Buitenzorg Botanical Garden as "Ins. Kai-Kamp. Ewoe." The Arnold Arboretum specimen was obtained from the Museum d'Histoire Naturelle, Paris, and bears the inscription "Reçu le 1 février 1927."

This is probably the plant recorded as *Elaeocarpus dasyphyllus* Scheff. by Dakkus in Bull. Jard. Bot. Buitenz. III. Suppl. 1: 122. 1930, without description. The specimen here designated as the type bears this binomial on the label, but apparently Scheffer never published it.

Aceratium dasyphyllum appears to be most closely related to *A. Versteegii* Schlechter, of southern Netherlands New Guinea, differing in its shorter-petiolate and smaller leaf-blades, which are subentire rather than "distincte crenato-dentata vel grosse dentata" at margins and apparently more persistently pilose beneath. Complete flowers of *A. Versteegii* have not been described, but the gynaecium is said to be about 17 mm. long. No other specimens of *Aceratium* have been recorded from the Kai Islands.

***Aceratium insulare* sp. nov.**

Arbor 8–20 m. alta, ramis teretibus cinereis, ramulis oppositis brevibus apicem versus complanatis breviter brunneo-strigosis mox teretibus glabratissque; foliis oppositis vel suboppositis, petiolis gracilibus 2–4 mm. longis breviter hispidulo-puberulis, laminis in sicco papyraceis fuscescentibus oblongo-ellipticis, 5–12 cm. longis, 2–5.5 cm. latis, basi late obtusis vel anguste rotundatis, apice cuspidatis vel breviter acuminatis et callosopapiculatis, margine inconspicue spinuloso-serrulatis (dentibus 3 vel 4 per centimetrum), supra costa puberula excepta glabris vel glabratis, subtus breviter et pallide sericeo-puberulis subglabrescentibus, costa supra paullo subtus valde elevata, nervis lateralibus utrinsecus 7–10 erecto-patentibus supra planis vel insculptis subtus elevatis, rete venularum inconspicuo utrinque prominulo vel supra plano; inflorescentiis laxe racemosis 2–4-floris, pedunculo et rhachi gracilibus 4–13 mm. longis cum pedicellis sparse puberulis vel sub anthesi glabratis, bracteis minutis caducis, pedicellis gracillimis sub anthesi 1–2 cm. longis; sepalis 5 tenuiter carnosius oblongolanceolatis, 7–8 mm. longis, 2–2.5 mm. latis, apice subacutis, utrinque inconspicue puberulis, intus carinatis; petalis 5 submembranaceis anguste cuneatis, 9–11 mm. longis, 4–5 mm. latis, apice emarginatis (quoque lobo dentibus 2 vel 3 circiter 1 mm. longis irregulariter crenulato-lobulatis laciniato), intus basim versus et margine copiose puberulo-tomentellis; disco annulari-pulvinato circiter 0.5 mm. alto inconspicue pallido-setuloso; staminibus 15 quam gynaecio brevioribus, filamentis filiformibus circiter 5 mm. longis glabris, antheris oblongis circiter 2 mm. longis ubique setulosius et apice pilis 0.4–0.7 mm. longis hispidis; gynaecio sub anthesi 7–9 mm. longo, ovario et styli basi copiose stramineo-setuloso-puberulis (pilis 0.1–0.15 mm. longis), loculis 3 vel 4, 8-ovulato, stylo 5–7 mm. longo subulato basi crasso superne glabro apice obscure 3- vel 4-fido; pedicellis sub fructu plerumque solitario ad 3 cm. longis; fructibus elongato-ovoideis glabris, maturitate 3–4.5 cm. longis et 1.5–2.5 cm. latis, inconspicue angulatis, basi rotundatis, apice subacutis et basi styli saepe apiculatis; pericarpio (mesocarpio fibroso conspicue fissio et endocarpio lignoso inclusis) 5–6 mm. crasso, pyrena 3- vel 4-loculari, seminibus ut videtur solitariis.

SOLOMON ISLANDS: Bougainville: Marmaromino, Buin, alt. 50 m., *Kajewski* 2189 (TYPE), Sept. 28, 1930 (common tree up to 10 m. high, in rain-forest; petals cream-colored; native name: *marangi kegitor* [fruit of the devil]); Kugimaru, Buin,

alt. 150 m., *Kajewski 1807* (common tree up to 20 m. high, in rain-forest; fruit red when ripe; native name: *marangi kegitor*); *Malaita*: Quoimonapu, sea-level, *Kajewski 2326* (common spreading tree up to 8 m. high, in swampy places in rain-forest; fruit red when ripe; leaves said to have been used as a poultice for spear- and arrow-wounds); *Guadalcanal*: Uulolo, Tutuve Mt., alt. 1200 m., *Kajewski 2616* (tree up to 20 m. high, common in rain-forest; fruit red, insect-stung and deformed).

Aceratium has not previously been reported from the Solomons, but its presence there has been indicated by the occurrence of *A. Braithwaitei* (F. v. Muell.) Schlechter¹ in the New Hebrides. The new species is more closely allied to *A. Braithwaitei* than to any of the New Guinean species, but it differs from the New Hebrides plant in its substantially smaller flowers. *Aceratium Braithwaitei* has the sepals about 12 mm. long, the petals 14–16 mm. long, the anthers about 3 mm. long, and the other parts proportionately large. The rachis and pedicels of the New Hebrides plant are stouter and more densely pilose than those of *A. insulare*. Although I have not seen mature fruits of *A. Braithwaitei*, Mueller's original description indicates that they are very similar to those described above.

***Aceratium Archboldianum* sp. nov.**

Arbor ad 10 m. alta (vel ultra?), ramulis hornotinis gracilibus brevibus subteretibus dense ferrugineo-tomentellis, vetustioribus glabratis cinereis; foliis oppositis vel suboppositis, petiolis validis subteretibus 2–8 mm. longis ut ramulis tomentellis, laminis chartaceis oblongis, 7–14 cm. longis, 3–5.5 cm. latis, basi rotundatis, apice acutis vel cuspidatis et calloso-apiculatis, margine integris apicem versus haud undulatis, utrinque pallide sericeo-puberulis demum costa excepta glabratis, costa supra valde elevata subtus prominente, nervis lateralibus utrinsecus 7–9 arcuatis supra subplanis subtus elevatis, rete venularum intricato supra obscuro subtus leviter prominulo; inflorescentiis breviter racemosis ut videtur circiter 4-floris, pedunculo et rhachi gracilibus ad 25 mm. longis cum pedicellis pilis 0.2–0.4 mm. longis dense ferrugineo-hispidulo-tomentellis, pedicellis 18–25 mm. (sub fructu ad 30 mm.) longis superne gradatim incrassatis; sepalis 5 tenuiter carnosius oblongo-lanceolatis, 19–21 mm. longis, 4–4.5 mm. latis, apice subacutis, extus breviter tomentellis, intus puberulis et carinatis; petalis 5 submembranaceis anguste cuneato-oblongis, 21–24 mm. longis, superne 4.5–5.5 mm. latis, apice 3–5-lobatis (dentibus 2–3 mm. longis emarginatis vel bilobulatis, segmentis obtusis), intus dimidio inferiorem et margine stramineo-hispidulo-puberulis; disco crasso pulvinato circiter 1.5 mm. alto pilis circiter 0.3 mm. longis stramineis hispidulo; staminibus 15 quam gynaeceo brevioribus, filamentis filiformibus 7–9 mm. longis glabris, antheris anguste oblongis 4.5–5 mm. longis ubique setulosis et apice pilis 0.5–0.8 mm. longis pallido-hispidis; gynaeceo sub anthesi 15–16 mm. longo quam petalis multo brevior, ovario pallide sericeo-hispidulo 3-loculari,

¹*Aceratium Braithwaitei* (F. v. Muell.) Schlechter in Bot. Jahrb. 54: 103. 1916.

Aristotelia Braithwaitei F. v. Muell. in Southern Science Record 1(10): 149. 1881.

Elaeocarpus Kajewskii Guillaumin in Jour. Arnold Arb. 12: 232. 1931; syn. nov.

NEW HEBRIDES: *Aneityum*: Anelgauhat Bay, sea-level, *Kajewski 710* (type coll. of *Elaeocarpus Kajewskii*); *Eromanga*: Dillon Bay, alt. 300 m., *Kajewski 297*.

The cited specimens agree with Mueller's description in all respects except the larger leaves; the type was collected on Tanna.

ovulis in quoque loculo 8, stylo subulato 11–12 mm. longo basim versus hispidulo-puberulo superne glabro apice obscure 3-fido; fructibus ovoideo-ellipsoideis demum glabratis maturitate ad 4 cm. longis et 2 cm. latis, haud angulatis, basi obtuse rotundatis, apice subacutis stylo plus minusve persistente coronatis; pericarpio ad 7 mm. crasso demum fisso, mesocarpio fibroso, endocarpio duro tenui, pyrena uniloculari, semine ut videtur solitario.

NETHERLANDS NEW GUINEA: Bele River, 18 km. northeast of Lake Habbema, alt. 2300–2350 m., *Brass* 11066 (tree 10 m. high, in forest substage), *Brass* 11526 (TYPE), Nov. 1938 (common in forest substage; flowers yellow-green).

Aceratium Archboldianum seems closely related only to *A. Ledermannii* Schlechter, from which it differs in its proportionately slightly narrower leaf-blades, its longer pedicels, sepals, and anthers, its less copiously laciniate petals, and its shorter gynaeceum, of which the ovary is pale sericeous-hispidulous rather than densely rufo-tomentulose. Closely related to *A. Archboldianum* are two specimens from Northeastern New Guinea (Morobe District, *Clemens* 6436a, 41710) with very immature flowers and mature fruits. The fruits have consistently 3-locular pyrenes, and flowers should be examined before the status of these two collections can be decided. In some characters they suggest *A. obtusidens* Schlechter, a species which differs from *A. Archboldianum* in its much smaller flowers and dentate leaf-blades.

Aceratium pachypetalum Schlechter in Bot. Jahrb. 54: 107. 1916.

NETHERLANDS NEW GUINEA: Humboldt Bay, alt. about 50 m., *Gjellerup* 985 (TYPE COLL.), Feb. 1912 (tree 5 m. high, in woods); Hollandia, alt. 100 m., *Brass* 8977 (tree 4 m. high, in older secondary rain-forest; branches long, drooping).

This is one of the species proposed by Schlechter with only a few inadequate notes, but nevertheless I believe that his name should be accepted as valid. Since ample material is now available from essentially the type locality, a full description is herewith added. The type is in flower, while the *Brass* specimen bears both flowers and fruits. Although the leaf-blades of this species are not as broad as implied in Schlechter's key, it is presumably properly placed as a relative of his *A. pittosporoides* and *A. molle*. The essentially globose fruit, as found in both *A. pachypetalum* and *A. pittosporoides*, is not usual for the genus.

Arbor parva, ramulis hornotinis gracilibus subteretibus densissime pallido-brunneo-tomentellis, vetustioribus cinereis glabratis; foliis oppositis, petiolis subteretibus 4–9 mm. longis ut ramulis tomentellis, laminis chartaceis in sicco brunescentibus ovato-ellipticis, (9–)11–16 cm. longis, (4–)5–8 cm. latis, basi obtusis vel subrotundatis, apice cuspidato-acuminatis (acumine ad 1 cm. longo), margine conspicue et remote mucronulato-dentatis, supra primo puberulis demum costa nervisque tomentellis exceptis glabris, subtus pallidioribus arcte cinereo-tomentello-puberulis, costa supra paulo elevata subtus prominente, nervis lateralibus utrinsecus 5–7 distantibus leviter curvatis anastomosantibus supra prominulis subtus valde elevatis, rete venularum intricato copioso utrinque prominulo; inflorescentiis breviter racemosis 4–6-floris, pedunculo et rhachi validis 6–10 mm. longis cum pedicellis 10–15 mm. longis dense brunneo-hispidulo-tomentellis;

sepalis 5 carnosis oblongo-lanceolatis, 11-13 mm. longis, 2.5-3.5 mm. latis, apice subacutis, extus ut pedicello tomentellis, intus puberulis et valde carinatis; petalis 5 tenuiter carnosis vel submembranaceis oblongo-cuneatis, 14-16 mm. longis, 4-5 mm. latis, apice 4-6-lobatis (dentibus 1-1.5 mm. longis saepe emarginatis, segmentis obtusis), intus basim versus et margine pallide hispidulo-puberulis; disco pulvinato circiter 1 mm. alto pilis circiter 0.2 mm. longis pallidis hispidulo-puberulo; staminibus ut videtur circiter 19 quam gynaecio brevioribus, filamentis filiformibus 4-6 mm. longis glabris, antheris oblongis 3-3.5 mm. longis setulosis apice breviter stramineo-hispidis; gynaecio sub anthesi 11-12 mm. longo, ovario subgloboso copiose pallido-hispidulo-tomentello 3- vel 4-loculari, ovulis 8 in quoque loculo, stylo subulato crasso 7-8 mm. longo basi hispidulo superne glabro; fructibus ellipsoideo-subglobosis puberulis demum glabris, ad 17×15 mm., haud angulatis, basi et apice rotundatis, stylo subpersistente coronatis; pericarpio (mesocarpio fibroso et endocarpio duro osseo inclusis) 3-4 mm. crasso, pyrena plerumque 4- interdum forsitan 3-loculari, dissepimentis validis persistentibus.

(To be continued)

STUDIES IN THE SIMAROUBACEAE, I THE GENUS CASTELA

ARTHUR CRONQUIST

EXTENSIVE chemical studies now in progress in the laboratories of Merck & Co., at Rahway, New Jersey, have rendered desirable systematic reviews of several genera of the Simaroubaceae. In the course of this work I intend to revise the New World representatives of the family. A comprehensive delimitation of the genera will be presented in due time.

The genus *Castela* was proposed by Turpin in 1806, with *C. depressa*, from the present Dominican Republic, as the type species. A second species, *C. erecta*, from Antigua, was described at the same time. Turpin wrote, and his figure clearly indicates, that *C. depressa* has a long slender style and a capitate slightly lobed stigma. He did not illustrate the flowers of *C. erecta*, but said that they "ne m'ont paru avoir aucune difference remarquable."

Castela erecta has been identified beyond doubt, and it has a short style column with divergent stigmas, as do all subsequently described species of the genus. Small¹ seized upon the supposed difference in styles and segregated all the species except *C. depressa* as a new genus, *Castelaria*. He apparently had no material of *C. depressa*, but took its character from Turpin's description. Material now available from the Dominican Republic has a short style column and long, recurved, almost circinately rolled stigmas, but is otherwise rather similar to Turpin's figure. No other species of *Castela* is known from the Dominican Republic, and *C. erecta*, which it most nearly resembles, approaches no nearer than St. Croix. The probability is that Turpin's description and figure are in error, and I am treating the recently collected plants from the Dominican Republic as *C. depressa*.

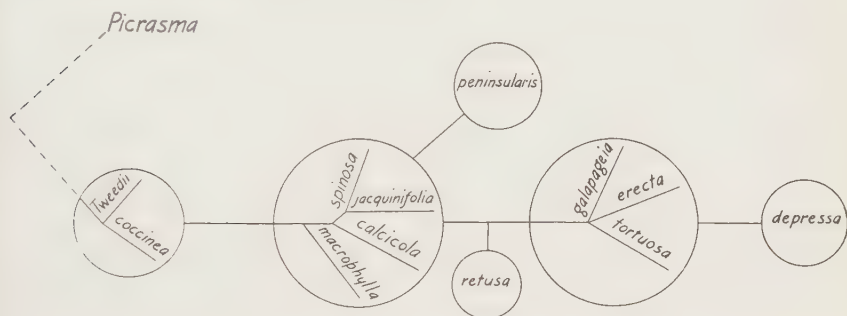
At the time he segregated the genus *Castelaria*, Small replaced the name *Castela* Turp. with *Neocastela* Small, rejecting the former because of its similarity to *Castelia* Cav., 1801, which is generally regarded as a synonym of *Priva*. However, *Castela* Turp. has recently been conserved (Kew Bull. 1940: 108, 1940).

Aside from the ditypic *Holacantha*, which appears to be a specialized offshoot of *Castela*, the latter seems most closely related to *Picrasma* (sens. lat., including *Aeschrion*), some species of which show a tendency toward reduction in size and number of leaflets, the leaflets resembling the leaves of *Castela*. The chief difference in flowers is that *Castela* has 8 stamens, whereas *Picrasma* has only 4.

There are several obvious species-groups in the genus *Castela*. *Castela erecta*, *C. galapageia*, and *C. tortuosa* are closely related and only doubt-

¹Small, J. K. Simaroubaceae. N. Am. Fl. 25: 227-239. 1911.

fully distinct. Presumably they had a common ancestor in relatively recent time. Three Cuban and one Jamaican species form another closely knit group: *C. spinosa*, *C. jacquinifolia*, *C. calcicola*, and *C. macrophylla*. The characters on which these are separated are minor, and they too would seem to have had a recent common ancestor. A third group is formed by *C. Tweedii* and *C. coccinea*, of South America. Though obviously related, these two species are amply distinct. Of the three remaining species, *C. peninsularis* seems to be an offshoot of the *C. macrophylla* group, *C. retusa* forms a connecting link between the *C. macrophylla* and *C. erecta* groups, and *C. depressa* is evidently related to *C. erecta*. A tentative phylogenetic arrangement is given below.



The geographic distribution of the species of *Castela* suggests that formerly continuous ranges have been broken up and are being progressively restricted. Even within the area of a single species, such as *C. tortuosa*, observations by collectors indicate that, while individuals are found in abundance in a given patch, it may be many miles between patches. Similarly, *C. erecta* is apparently found on relatively few of the West Indian islands, although more collecting will presumably increase the number of known stations.

I wish to thank Dr. R. T. Major, Director of the Research Laboratory of Merck & Co., Inc., who made this study possible, Dr. H. A. Gleason and Mr. B. A. Krukoff, of the New York Botanical Garden, who have given helpful advice and criticism and aided in obtaining necessary material, and the curators of the following herbaria (designated hereinafter by the letters at the left), who have loaned specimens for study:

- A—Arnold Arboretum, Harvard University,
- F—Field Museum of Natural History, Chicago,
- G—Gray Herbarium, Harvard University,
- Mich—University of Michigan, Ann Arbor,
- Mo—Missouri Botanical Garden, St. Louis,
- NY—New York Botanical Garden,
- US—United States National Herbarium, Washington, D. C.,
- Y—Yale University School of Forestry, New Haven, Conn.

Specimens cited as Kr. Herb. are mostly vouchers received by Mr.

Krukoff in connection with samples for chemical analysis. Most of the Gray Herbarium material was examined at Harvard, and only critical specimens are cited.

KEY TO THE SPECIES

1. Filaments very conspicuously thickened toward the base; plants of northern Argentina and adjacent area.
 2. Flowers delicate, the petals mostly 3–3.5 mm. long, the anthers mostly 1.2–1.5 mm. long; leaves downy-pubescent with spreading hairs to essentially glabrous beneath, essentially glabrous above except for some fine hairs along the midrib; spines slender, mostly unbranched and not more than 2 cm. long.2. *C. Tweedii*.
 3. Leaves essentially glabrous beneath.2a. *C. Tweedii* var. *typica*.
 3. Leaves downy-pubescent beneath.2b. *C. Tweedii* var. *macrophylla*.
2. Flowers larger and coarser, the petals mostly 4.5–5 mm. long, the anthers mostly 2–2.5 mm. long; leaves with a fine and closely appressed yellowish and somewhat glutinous-appearing pubescence beneath (occasionally becoming subglabrate at maturity), glabrous above, or slightly pubescent like the lower surface; spines coarse, commonly branched, often well over 2 cm. long.1. *C. coccinea*.
1. Filaments only slightly or moderately thickened toward the base; plants of the Galapagos Islands, Colombia, Venezuela, the West Indies, Mexico, and southern U. S. A. (Texas).
 2. Leaves white-tomentose beneath, shining and glabrous or nearly so above; young twigs conspicuously white- or gray-tomentose except in *C. retusa*, where merely puberulent.
 3. Leaves mostly well over 1 cm. long and more than half as wide, rounded to retuse and sometimes mucronulate at the apex; tomentum thin and sparse; young twigs densely puberulent, but not tomentose; plant of Oaxaca, Mexico.8. *C. retusa*.
 3. Leaves when over 1 cm. long not more than half as wide, acute to obtuse or sometimes rounded at the apex, often mucronulate, but not retuse; tomentum dense; young twigs tomentose.
 4. Trailing or ascending shrub of the Dominican Republic; style branches recurved, almost circinate-ly rolled; leaves rounded to subcordate at the base.12. *C. depressa*.
 4. Erect shrubs, not of the Dominican Republic; style branches stiffly spreading; leaves acute to rounded at the base, but scarcely subcordate.
 5. Network of veins on the lower surface of the leaves raised and conspicuous to the naked eye; veins glabrous, or less densely pubescent than the areolae; plant of the Galapagos Islands.10. *C. galapageia*.
 5. Network of veins on the lower surface of the leaves usually inconspicuous when viewed with the naked eye; veins equally as pubescent as the areolae.
 6. Leaves mostly over 1.5 cm. long; network of veins on the lower surface of the leaves readily evident when viewed with a lens; plant of northern Colombia and Venezuela and the West Indies.11. *C. erecta*.
 6. Leaves mostly 1.5 cm. long or less; network of veins on the lower surface of the leaves usually relatively obscure even when viewed with a lens; plant of southern Texas, U. S. A., to Oaxaca, Mexico.9. *C. tortuosa*.
 2. Leaves glabrous or pubescent above and beneath, but not white-tomentose; young twigs variously pubescent, but not tomentose.
 3. Leaves appearing dull, copiously pubescent with spreading hairs beneath, similarly but less densely pubescent above; twigs pubescent like the lower surfaces of the leaves; plant of Baja California, Mexico.7. *C. peninsularis*.
 3. Leaves shining, glabrous or hispidulous to puberulous on one or both surfaces; twigs variously pubescent; plants of the West Indies.

4. Leaves glabrous, except sometimes for a few small hairs on the midrib; petals glabrous, 3-4 mm. long; plant of Oriente, Cuba. 5. *C. jacquinifolia*.
4. Leaves sparsely to moderately hispidulous or hirtellous at least beneath, also above except sometimes in *C. macrophylla*; plants of Jamaica and western Cuba.
5. Plant very thorny, the thorns long, stout, and branched; petals hispidulous, 4-4.5 mm. long; plant of western Cuba. 6. *C. spinosa*.
5. Plant only slightly or moderately thorny, the thorns mostly simple and short, or wanting.
6. Leaves rounded or retuse at the apex, sparsely to moderately hispidulous on both sides; petals hispidulous, 3.5-4 mm. long; plant of western Cuba. 4. *C. calcicola*.
6. Leaves acute at the apex, except on vigorous young shoots, sparsely to moderately hirtellous or hispidulous beneath, often glabrous above; petals slightly hispidulous or glabrous, 2.5-3 mm. long; plant of Jamaica. 3. *C. macrophylla*.

CATALOGUE AND COMMENTS

1. *Castela coccinea* Griseb. Abh. Ges. Wiss. Goett. **19**: 107. 1874.

TYPE: *Lorentz & Hieronymus 514*, "in fruticetis Sierra Cordoba occidentalibus," Cordoba, Argentina (F-photo, NY-photo).

DISTRIBUTION: Known only from northern Argentina and adjacent Paraguay.

ARGENTINA: *Lorentz & Hieronymus 40* (F, US), 570 (NY); Jujuy: *Eyerdam & Beetle 22498* (Mo); Salta: *Eyerdam & Beetle 22892* (Mo); *Venturi 9497* (A, Mo, US); Tucumán: *Venturi 1391* (A, US); Santiago del Estero: *Venturi 9731* (A, Mo, US); Chaco: *Jorgensen 1951* (Mo, US); *Schulz s.n.* (Kr. Herb. #16378A). PARAGUAY: *Rojas 2450* (US).

Collectors' notes indicate that this species is a shrub up to about 3 meters high. The pubescence on the lower surface of the leaves is sometimes so fine as to escape notice except under very careful observation with a good lens. There is a noticeable though scarcely tangible difference in the texture of the leaves of this and *C. Tweedii*, and these two may likewise be separated from other species of the genus by intangibles of leaf character and venation, after a little experience with the group.

2. *Castela Tweedii* Planch. Lond. Jour. Bot. **5**: 569. 1846.2a. *Castela Tweedii* var. *typica* nom. nov.

Castela Tweedii Planch. Lond. Jour. Bot. **5**: 569. 1846.

? *Castela alaternifolia* Planch. loc. cit. "Chili absque loco proprio." No members of the Simaroubaceae are known to occur in Chile, and the description suggests a broad-leaved form of *C. Tweedii*.

Castela Tweedii var. *dentata* Engl. Nat. Pfl. **34**: 219. 1896.

TYPE: *Tweedie s.n.*, "Parana et Banda oriental," Brazil.

DISTRIBUTION: Known from Uruguay to Paraguay and adjacent Brazil.

URUGUAY: *Ball s.n.*, in 1882 (NY); *Lorentz s.n.*, October 30, 1875 (F-photo). ARGENTINA: Entre Rios: *Baez s.n.* (Kr. Herb. #16371); Corrientes: *Bonpland 1205* (NY), 1207 (NY). PARAGUAY: *Hassler 11042* (A), 11063 (A).

2b. *Castela Tweedii* var. *macrophylla* Chod. & Hass. Bull. Herb. Boiss. II. **3**: 800. 1903.

TYPE: *Hassler 736*, "in dumetis Cordillera de Altos," Paraguay (NY, isotype).

DISTRIBUTION: Known only from Paraguay.

PARAGUAY: *Fiebrig 7* (A, F, US); *Hassler 3025* (A), 11792 (A, F, Mo), 11792a (A, Mo), 12801 (A, Mo).

This species is reported to reach tree size, but the type of var. *macrophylla* was described as a shrub 3–4 meters high. The variety *macrophylla* was founded on the size of the leaves, which is of no taxonomic significance in this case, but the type happens to belong to the pubescent-leaved phase of the species, so that the inappropriate name must be preserved.

3. ***Castela macrophylla*** Urb. Symb. Ant. **5**: 377. 1908.

Castelaria macrophylla Small, N. Am. Fl. **25**: 232. 1911.

TYPE: *Harris* 9219, Great Goat Island, Jamaica (F, NY, isotypes).

DISTRIBUTION: Confined to Jamaica.

JAMAICA: *Britton* 1295 (NY), 2825 (NY); *Britton & Hollick* 1843 (NY, US); *Harris* 9347 (A, NY, US), 9348 (A, NY), 10047 (NY), 12471 (Mo, NY, US); *Lortet* s.n. (Kr. Herb. #16317).

4. ***Castela calcicola*** (Britton & Small) Ekman ex Urb. Repert. Sp. Nov. **20**: 304. 1924.

Castelaria calcicola Britton & Small, Bull. Torrey Club **44**: 34. 1917.

TYPE: *Shafer* 13434, limestone hills, vicinity of Sumidero, Pinar del Rio, Cuba (NY); isotype (Mo).

DISTRIBUTION: Known only from Pinar del Rio, Cuba.

CUBA: Pinar del Rio: *Britton & Cowell* 9981 (NY); *Shafer* 13386 (NY, US).

5. ***Castela jacquinifolia*** (Small) Ekman ex Urb. Repert. Sp. Nov. **20**: 304. 1924.

Castelaria jacquinifolia Small, N. Am. Fl. **25**: 232. 1911.

TYPE: *Britton* 2198, Leeward Point, Guantanamo Bay, Oriente, Cuba (NY).

DISTRIBUTION: Known only from Oriente, Cuba.

CUBA: Oriente: *Clement* 107 (NY), 155 (NY).

6. ***Castela spinosa*** sp. nov.

Frutex spinosissimus, spinis longis ramosis, ramulis hirtellis; foliis nitidis utrinque hirtellis ex late lanceolatis oblongisve ellipticis vel subrotundis, obtusis vel acutis, perspicue reticulato-venosis, circa 1–2 cm. longis et 4–10 mm. latis; petalis coccineis hispidulis 4–4.5 mm. longis; antheris circa 2–2.5 mm. longis; drupis coccineis circa 1 cm. longis.

TYPE: *Shafer* 11082, rocky places, Las Martinas to the Coast, Pinar del Rio, Cuba, December 19, 1911 (NY); isotype (US).

DISTRIBUTION: Pinar del Rio and Habana, Cuba.

CUBA: *Hioram* 2186 (NY); *Wright* 2193 (Mo, NY, US); *HABANA*: *Leon* 7219 (NY); *Pinar del Rio*: *Acuna* s.n. (Kr. Herb. #16467); *Roig* 3931 (NY).

This species was first recognized by Percy Wilson, who assigned it the same epithet here used, in an unpublished combination under *Castelaria*. It is the *C. erecta*, in large part, of Small's treatment in North American Flora, but it is not closely related to the original *Castela erecta* Turp.

7. ***Castela peninsularis*** Rose, Contr. U. S. Nat. Herb. **12**: 278. 1909.

Castelaria peninsularis Small, N. Am. Fl. **25**: 231. 1911.

TYPE: *Purpus* 244, San José del Cabo, Baja California, Mexico.

DISTRIBUTION: Baja California, Mexico, especially near the coast, from Magdalena Bay around the cape to Santa Catalina Island.

MEXICO: Baja California: *Brandegge* s.n., October 29, 1893 (NY), January, 1889 (A); *Collins, Kearney, & Kempton* 124 (US); *Johnston* 3918 (US), 3928 (A, Mo, NY), 3983 (US); *Rose* 16295 (NY, US), 16399 (NY, US), 16547 (US), 16850 (NY, US), 16865 (US), 16909 (US).

8. *Castela retusa* Liebm. Vidensk. Meddel. **1853**: 108. 1854.

TYPE: *Liebmann s.n.*, between Tehuantepec and Oaxaca, Oaxaca, Mexico (F-photo).

DISTRIBUTION: Known only from Oaxaca, Mexico.

MEXICO: Oaxaca: *Seler* 1749 (G).

This species connects the *C. erecta* group with the *C. macrophylla* group. The tomentum on the lower surface of the leaves is sparser and much less conspicuous than in *C. erecta* and its allies, and the leaves are otherwise suggestive of the *C. macrophylla* group. It is apparently rare, being known from only one collection besides the type.

9. *Castela tortuosa* Liebm. Vidensk. Meddel. **1853**: 108. 1854.

Castela Nicholsoni β *texana* Torr. & Gray, Fl. N. Am. **1**: 680. 1840.

Castela texana Rose, Contr. U. S. Nat. Herb. **12**: 278. 1909.

Castalaria texana Small, N. Am. Fl. **25**: 231. 1911.

Castalaria tortuosa Small, loc. cit.

? *Castela salubris* Boas, Beih. Bot. Centr. **291**: 342. 1913. If the statement in the original description that the petals of *C. salubris* are only 1.5 mm. long applies to boiled flowers, the plant deserves some sort of segregation from typical *C. tortuosa*.

Castela salubris var. *Endlichiana* Boas, Repert. Sp. Nov. **12**: 224. 1913.

TYPE: *Liebmann* 4252, Tehuacan de las granadas, Puebla, Mexico (US, isotype).

DISTRIBUTION: Oaxaca, Mexico, to southern Texas, U. S. A.

MEXICO: *Gregg s.n.*, May, 1847 (NY); Oaxaca: *Gonzalez* 984 (US); *Liebmann* 4252 (but data not as the type) (F); *Nelson* 1885 (US); Puebla: *Liebmann* 15053 (F); *Rose, Painter, & Rose* 10007 (NY, US); San Luis Potosi: *Salazar s.n.*, February 22, 1913 (US); Tamaulipas: *Bartlett* 10720 (A, F, US), 11015 (F, US), 11173 (F); *LeSueur* 236 (F); *Nelson* 6614 (US); *Palmer* 121 (Mo, US), 129 (US); *Parry et al.* 160 (NY, US); *Sours s.n.* (Kr. Herb. #16001); *von Rozyński* 743 (F, NY); *Wizlizenus* 366 (Mo); *Wootton s.n.*, June 21, 1919 (US); Nuevo Leon: *Edwards* 391 (F); *Taylor* 391 (Mo); *Thurber* 863 (NY); *Wizlizenus* 323 (Mo); Coahuila: *Kenoyer* 28 (F); *Parry & Palmer* 107 (Mo, US); Chihuahua: *Wizlizenus* 254 (Mo). UNITED STATES: Texas: *Ferris & Duncan* 3061 (Mo, NY); *Heller* 1402 (Mo, NY, US); *Howard s.n.*, 1892 (Mich, NY); *Jermy s.n.*, in 1904 (Mo, US); *Mackenzie* 44 (Mo, NY); *Palmer* 152 (Mich, Mo); *Palmer* 12951 (A, Mo); *Wright* 85 (NY, US).

Collections from Texas are so numerous that I have cited only a small proportion of them.

The difference between *C. tortuosa* and *C. erecta* in prominence of the veins of the leaves is neither very great nor entirely constant, yet it is helpful after one has established some standards by comparison of specimens of each.

10. *Castela galapageia* Hook. f. Trans. Linn. Soc. **20**: 229. 1851.

Castalaria galapageia Moldenke, Phytologia **1**: 8. 1933.

TYPE: *Darwin s.n.*, Chatham Island, Galapagos Islands.

DISTRIBUTION: Galapagos Islands.

GALAPAGOS ISLANDS: *Stewart* 1750 (US), 1754 (US), 1759 (US), 1761 (US); *Wheeler, Rose, & Beebe* 43 (NY), 50 (NY, US).

This species seems to have retained wide variability in leaf size, whereas *C. tortuosa* has become relatively small-leaved and *C. erecta* has become relatively large-leaved in most cases. Several forms have been described,

but intensive study by Stewart² has shown that these have no taxonomic value.

11. *Castela erecta* Turp. Ann. Mus. Par. **7**: 80. t. 5B. 1806.

Castela Nicholsoni Hook. Bot. Misc. **1**: 271. 1830.

Castalaria Nicholsoni Small, N. Am. Fl. **25**: 231. 1911.

Castalaria erecta Small (as to name), loc. cit. 232.

TYPE: *Richard s.n.*, Antigua, West Indies.

DISTRIBUTION: Known from northern Colombia and Venezuela, and Margarita, Cubagua, Antigua, and St. Croix Islands; to be expected on some of the other islands of the West Indies.

COLOMBIA: *Dawe 517* (US). VENEZUELA: *Curran & Haman 429* (US); *Sucre: Curran & Haman 1249* (A, NY, US); *Lara: Saer 23* (US); *Zulia: Pittier 10546* (NY, US); *Nueva Esparta: Cubagua: Cooper 216* (NY, US, Y); *Margarita: Johnston 118* (NY, US); *Miller & Johnston 236* (F, Mo, NY, US). ST. CROIX: *Britton, Britton, & Kemp 55* (NY, US); *Haunien s.n.* (NY); *Ricksecker 377* (Mo, NY, US); *Rose, Fitch, & Russell 3529* (NY, US); *Thompson 176* (NY). ANTIGUA: *Box 738* (US); *Nicholson s.n.*, September 26, 1850 (NY); *Warneford s.n.* (Kr. Herb. #16434).

Some specimens from Venezuela have the leaves no longer than is usual for *C. tortuosa*, though they are generally somewhat broader. *C. erecta*, *C. galapageia*, and *C. tortuosa* are very closely related, and accumulation of more material may force their combination into one species. Until then, in view of their geographic segregation, I think it best to continue the traditional treatment of regarding them as distinct, although I realize that the lines between them are very tenuous.

12. *Castela depressa* Turp. Ann. Mus. Par. **7**: 79. t. 5A. 1806.

Neocastela depressa Small, N. Am. Fl. **25**: 230. 1911.

TYPE: *Turpin s.n.*, "Ile de Saint-Domingue, entre Mont-Christ et Saint-Yague," Dominican Republic.

DISTRIBUTION: Known only from the Dominican Republic.

DOMINICAN REPUBLIC: *Jimenez 6018* (Herb. Jimenez); *Jimenez s.n.* (Kr. Herb. #16134).

DOUBTFUL OR EXCLUDED SPECIES

Castela lychnophoroides Liebm. Vidensk. Meddel. **1853**: 111. 1854. Described without flowers or fruit, and probably not a *Castela*.

Castalaria Brittonii Small, N. Am. Fl. **25**: 232. 1911 = *Henoonia Brittonii* (Small) Monachino.

Castela Brittonii (Small) Engl. Nat. Pfl. II. **19a**: 385. 1931 = *praec.*

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²Stewart, A. Am. Jour. Bot. **2**: 279-288. 1915.

SCHISANDRA MICHAUX, NOMEN GENERICUM
CONSERVANDUM

ALFRED REHDER

THE validity of the name *Schisandra* Michaux seems never to have been questioned. Neither de Candolle, in 1817 and 1824, nor Bentham and Hooker, in 1862, cite *Stellandria* Brickell of 1803 as a synonym. Brickell's name was published the same year as *Schisandra* Michaux, but evidently several weeks earlier than Michaux's name.

Brickell's paper containing the generic and specific description of *Stellandria* and its only species, *S. glabra*, was published in number 3 of vol. 6 of the Medical Repository of New York. This volume was the last of the first hexade; of this hexade each volume starts in the middle of the year and was published in quarterly numbers, the third number appearing at the beginning of the following year. The numbers probably had covers which may have borne the exact date of publication, but none of the libraries I consulted had a copy with the covers preserved. Fortunately each number has several dated communications which allow a conclusion as to the approximate date of issue. Of number 3 (pp. 237-352) in volume 6, the latest dated communication is of February 22, appearing on p. 342 near the end of the number,¹ which shows that the number was published either at the very end of February or early in March. The latest date in number 4 is March 31 (p. 442), which indicates that the number came out sometime in April. The numbers being issued quarterly, number 3 should have appeared about three months before number 4, which apparently is not the case here, but it strengthens the assumption that number 3 must have appeared early in March.

Michaux's *Flora Boreali-Americana* apparently did not appear before March, 1803. The earliest notice of this work appeared in the *Allgemeine Literatur-Zeitung* in the number of March 19 of its *Intelligenzblatt*, where Michaux's *Flora Boreali-Americana* is enumerated as being for sale in Paris and Strasburg: "bei den Gebrüdern Levrault, Buchhändlern in Paris und Strasburg, sind folgende Bücher in Menge zu haben . . . *Flora Boreali-Americana* . . . par Michaux . . ." (See Bernice G. Schubert in *Rhodora* 44: 149. 1942). There is also a later note on the publication of Michaux's *Flora Boreali-Americana* in *Journal Général de la Litterature de la France* 6 (no. 5): 133 (an XI, Floréal [= April-May, 1803]). The dates of Michaux's *Flora* and Brickell's article are certainly very close, but there is no reason to assume that Michaux's work came out earlier than number 3 of volume 6 of the Medical Repository.

¹In this communication the establishment of the American Board of Agriculture is announced with a list of the members of the Board. The Constitution of the Board is reprinted in the following number of the Medical Repository on pp. 465-469.

Though *Schisandra* is not a large genus, containing about 15 species in eastern and southern Asia and one in North America, and is of neither economic nor horticultural importance, it is the type of a distinct group of the Ranales including the genus *Kadsura* Juss., with its name derived from *Schisandra*, the type of the group. By most authors this group is considered a tribe or subfamily of Magnoliaceae, called by Gray (in Gen. Pl. U. S. **1**: 54. 1849) tribe Schizandreae, and by Harms (in Ber. Deutsch. Bot. Ges. **15**: 358. 1897) subfam. Schizandroideae. By some older authors the group has been placed under the Menispermaceae, as by de Candolle (Prodr. **1**: 104. 1824) designated as Menispermeae trib. Schizandreae, and by Spach (Hist. Nat. Vég. Phan. **8**: 6. 1839) as Menispermaceae trib. Schizandreae. Other authors consider it a distinct family, as Guillemain (in Dict. Class. Hist. Nat. **15**: 239. 1829) under the name Schizandreae, G. Don (Gen. Hist. Dichlam. Pl. **1**: 101. 1831) as Schizandriaceae, Blume & Fischer, Fl. Java **3**: 1. 1836) as Schizandraceae.

Michaux's original spelling, *Schisandra*, was used by all authors up to 1818, as by Willdenow, Sp. Pl. **4**: 372 (1805), Poiret, Encyc. Méth. Bot. **6**: 729 (1805), Sims in Bot. Mag. **34**: t. 1413 (1811), Aiton f., Hort. Kew., ed. 2, **5**: 268 (1811), Pursh, Fl. Bor.-Am. **1**: 212 (1814), Nuttall, Gen. N. Am. Pl. **2**: 209 (1818), except Desfontaines, Hist. Arb. Arbriss. **2**: 25 (1809), who spells the name *Schizandra*.

After the publication, however, in 1817 of the first volume of de Candolle's Regni Vegetabilis Systema Naturale, in which he used the spelling *Schizandra* without explanation of its derivation, most authors, except some more recent authors, one of the earliest being Schneider (Ill. Handb. Laubholzk. **1**: 340. 1905), accepted his spelling, considering it apparently a correction, since almost all generic names of similar derivation begin with Schiz . . . , the first part of the compound name being derived from $\sigma\chi\iota\zeta\epsilon\upsilon\nu$, to split. Also, in works like Wittstein, Ethymodogisch-Botanisches Handwörterbuch, p. 792 (1852), and Backer, Verklarend Woordenboek, p. 517 (1936), the name is said to be derived from $\sigma\chi\iota\zeta\epsilon\upsilon\nu$ and $\alpha\nu\eta\mu$ and this derivation is found in all books in which the derivations of the botanical names are given, though Michaux states explicitly that *Schisandra* is derived from " $\Sigma\chi\upsilon\sigma\iota\varsigma$, $\text{Av}\eta\mu$: fissurae antheris interjectae"; $\sigma\chi\iota\varsigma\iota\varsigma$ or more correctly written $\sigma\chi\iota\sigma\iota\varsigma$, division, splitting, and $\alpha\nu\eta\mu$, man. Therefore the spelling *Schisandra* is correct according to its derivation, and, being the original spelling, it should be maintained.

Chiefly for the reason that *Schisandra* is the type of a distinct group of the Ranales with its name or names based on this genus, and because *Stellandria* has never been used by any subsequent author and seems not to have been listed even as a synonym until cited in 1895 by Jackson, Ind. Kew. **2**: 826, under *Schizandra*, the name *Schisandra* is here proposed for conservation.

Schisandra Michaux, Fl. Bor.-Am. **2**: 218, *t.* 47 (March, 1803)

versus

Stellandria Brickell in Med. Repos. New York **6** (no. 3): 327 (end of Feb. or early in March, 1803).

Schizandra Desfontaines, Hist. Arb. Arbriss. **2**: 25 (1809). — De Candolle, Reg. Veg. Syst. **1**: 544 [1817]; Prodr. **1**: 104 (1824).

Sphaerostema Blume, Bijdr. Fl. Nederl. Ind. 22 (1825). — G. Don, Gen. Hist. Dichlam. Pl. **1**: 101 (1831) "*Sphaerostemma*."

Cosbaea Hort. ex Lemaire in Ill. Hortic. **2** (Misc.): 71, *fig.* (1855).

Maximowiczia Ruprecht in Bull. Phys.-Math. Acad. Sci. St. Pétersb. **15**: 142, *t.* 2 (in Mél. Biol. **2**: 439, *t.* 2. 1857) (1856) "*Maximowitschia*" sub tab.

TYPUS: *Schisandra coccinea* Michx. = *S. glabra* (Brickell) Rehder.

Schisandra glabra (Brickell) comb. nov.

Stellandria glabra Brickell in Med. Repos. New York **6** (no. 3): 327 (end of Feb. or early in March, 1803).

Schisandra coccinea Michaux, Fl. Bor.-Am. **2**: 219, *t.* 47 (March, 1803). — Desfontaines, Hist. Arb. Arbriss. **2**: 25 (1809), "*Schizandra*." — De Candolle, Reg. Veg. Syst. **1**: 544 [1817], "*Schizandra*."

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

